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Railway Age

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Vol. 86

May 4, 1929

No. 18

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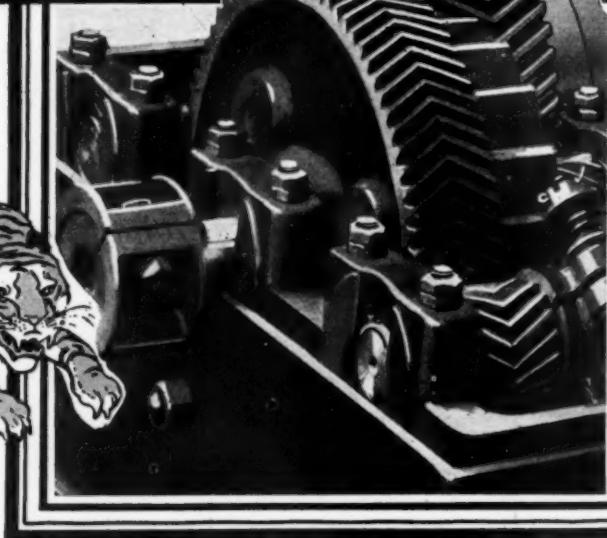
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A New Era in



Two "Tigers" at work for
the Murray Corporation of
America, Detroit, Mich.



Herringbone Gears are One of Many "Tiger" Features.

WHITING *Tiger* **CRANE**

Railway Age

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April Equipment Orders

RAILWAY equipment ordered for domestic service in April showed a gain over the totals reported during the same period in 1928. Passenger car orders were outstanding, with contracts placed for 250, making the largest monthly total for the year. This compares with 142 passenger cars ordered during April, 1928. However, there having been heavy buying during January, 1928, the cumulative total for passenger car orders for the first four months fell slightly below last year's, with 552 cars ordered in 1929 to date, as compared with 884 ordered during the first four months of 1928. Locomotive orders during April reached a total of 58, which compares favorably with a total of 33 ordered in the corresponding month last year. This brought the total number of locomotives ordered thus far this year to 296 as compared with 80 ordered during the same period in 1928. Freight car orders showed an increase over the total for April, 1928, with orders for 6,983 reported as compared with 5,683 ordered last year. The total number of freight cars ordered to date this year is now 44,896, in comparison with 17,686 ordered in the corresponding one-third of last year. A slight decrease was reported in orders for structural steel in comparison with last year's total, while no orders for rails were reported during the past month.

Taking the Ballyhoo Out of Safety Methods

ONE thought which recurred again and again throughout the papers presented before the three-day meeting of the Safety Section at Indianapolis was that ballyhoo methods of accident prevention, if not already in the discard, are rapidly headed in that direction. Representatives of a number of roads stated from the platform that they had discontinued the use of spectacular methods while the same thought was aptly expressed by an assistant superintendent who said that on his division safety educational work was taken too seriously to link it up with "band music, parades or ballyhoo." In the early days of the safety movement the evangelistic methods served a useful purpose in getting the safety-first idea before a large number of employees in a short time. Personal safety instruction among the negligent and careless members of separate gangs by their foremen has now been substituted as a means of preventing accidents. Executive officers are fast acceding to the belief that the performance of duties in a safe manner does not lessen efficiency, but, on the other hand, usually means that operations are carried on in a more efficient manner. The two or three outstanding examples of accident prevention in the shop and yard that were presented at Indianapolis

were accompanied by the efficient handling of a greater volume of business. The elimination of accidents meant that yard crews and shop gangs were not being continually filled with inexperienced and careless substitutes. And in each case the excellent record was the result of a supervisory officer's untiring drive for safe performance of duties by personal instruction.

A Railroad Investment Trust and an Investment Trust Railroad

THE formation of an investment trust, the Pennroad Corporation, for the benefit of the stockholders of the Pennsylvania Railroad is a development which has potentialities, at least, of the greatest interest and importance. It is specifically stated that the new company is empowered to invest in all agencies of transportation—water, air and highway, but that it will not at present invest in railway securities. Here is, apparently, a development which offers promise of an experiment in the thorough-going co-ordination of transportation, utilizing all methods and without the temptation to favor one agency over the other except on logical grounds of economy or efficiency. If this development proceeds as it well may, it will provide an experiment of great value to other railroads. So much for an investment trust controlled by a railroad—or at least by the stockholders of a railroad; another recent event in railroad finance of almost equal interest is the acquisition of control of a railroad by an investment trust, reversing the situation of the Pennroad Corporation. What effect would a tendency such as this—and with the growth of investment trusts it may well develop into a tendency—have on the future of the railroads? It is difficult to determine definitely. These trusts, employing investment experts, may possibly show a somewhat greater interest in the affairs of companies in which they are interested than can the average individual stockholder. On the other hand, they are middlemen between the individuals who advance the funds and the companies which receive them. In this respect they are analogous to savings banks or insurance companies. One of the great public relations tasks of the railways has been to secure adequate realization by participants in railroad ownership of their selfish interest in railroad prosperity. The individual security holder generally has this knowledge. The savings bank depositor or the insurance policyholder has not always been so quick to grasp it, although his interests and those of the individual security holder are identical. If the spread of investment trusts should tend to decrease the number of individual security owners, then it would seem to indicate the necessity for even more vigorous public relations work. That may be one outcome of this development.

The Psychology of Pressure Lubrication

Possibly few would expect to find that psychology was an important factor in so prosaic an operation as lubricating locomotive driving rods. However, it provides one of the most potent reasons for the success of pneumatic and mechanical pressure systems for lubricating driving rods and other moving parts of locomotives as well. Some of these systems have been in service long enough to demonstrate their practicability and merit in meeting railroad requirements. In general they operate by simply pressing a trigger or moving a lever, which, through a suitable mechanism readily applied to the rod, forces lubricant at several thousand pounds per square inch pressure between the bearing surfaces. These systems are successful primarily because positive and thorough application of the lubricant is made easy, if not a pleasure, compared to former methods. The grease plug and hand wrench method, now commonly used, is a relatively tedious operation, taking four to six times as long as with one of the modern pressure systems. Moreover, the grease is supplied so slowly that it is not always easy to tell when a bearing is completely filled. As a result, there is a strong temptation to supply less than the desired amount of grease to rod bearings, especially if locomotives are needed in a hurry, or weather conditions provide an incentive for the locomotive oiler to get back into the enginehouse or oil house as soon as possible. More than one epidemic of hot crank pins has been traced to this single cause. The great advantage of making it easy to do the job of lubricating locomotives right is self-evident.

Passenger Business Increases in Britain—Revenue Declines

RAILWAYS of Great Britain during 1928 carried 4,395,000 more passengers than in 1927 but, despite this fact, their gross passenger revenues were two per cent under those of the preceding year. Such is the net result of an intensive effort to meet highway competition with concessions in rates and service designed to attract travelers back to the rails. Commenting upon this situation in a statement which accompanied the publication of the preliminary railway returns, Sir Ralph Wedgwood, chairman of the general managers' conference, said: "This reduction (in revenue) is due mainly to road competition, but when compared with the heavy falling-off experienced in previous years, it indicates that the railways are achieving success in preventing a further drift of railway traffic to the roads. This has been done largely by the quotation of cheap fares, provision of day excursions and by more intensive train services. . . . At the same time there has been an increase of no less than 8,000,000 miles in passenger train mileage. . . . This increase has been undertaken as part of a definite policy to bring traffic back to rail" The foregoing indicates that declines in passenger business may be checked if rate and increased service concessions be multiplied, but this does not take into account the net revenue derived from the service. American railroads, have found that their net revenues may be protected in a less costly manner by the operation of co-ordinated motor coach services where circumstances dictate that the motor coach is the more economical vehicle

of transport; although, of course, improving service and the offering of attractive rates is also important where such concessions give promise of added net revenues. The motor coach will no doubt be adopted more extensively by British railways, supplementing their efforts to attract business for their rail services, when their road transport operations are fully organized under the recently acquired Parliamentary powers to operate on the highways.

Negotiating for Automatic Highway Crossing Protection

RAILWAYS desiring to modernize their highway crossing protection will find a suggestion for procedure in a recent decision of the United States Supreme Court involving an accident at a street crossing of the Nashville, Chattanooga & St. Louis, in the city of Memphis, Tenn., where a train struck an automobile, killing the driver and injuring three other occupants of the car. This crossing was protected by an automatic flashing-light signal, and while proof was presented that the occupants of the automobile knew that the railway did not maintain a human flagman at this crossing they were awarded damages, the decision being based on the validity of a city ordinance passed in 1880, requiring all railroads in Memphis to maintain a flagman waving a flag in the daytime and a red lighted lantern at night at grade crossings to give warning of approaching trains. This ordinance has not been enforced and, according to the best information, no flagman had ever been maintained at the crossing in question, while records show that for at least eleven years no flagman had been employed. The railroad had voluntarily installed automatic flashing-light signals, not only at this crossing but at other crossings in the city, and the city authorities had not only acquiesced, but had encouraged the use of these electrical devices, and in a conference unanimously approved this type of signal as affording better protection than a human flagman.

The railway admitted that the ordinance was valid when passed because at that time human flagmen constituted the best known method of protection. However, it contended that in view of changed conditions, due to inventive genius, mechanical flagmen furnished the public greater protection, at less cost, than human flagmen. The contention, therefore, was that as the city authorities, which passed the ordinance, had never weighed the comparative worth of the two forms of protection, to require the continuation of a wholly obsolete form of protection lacked due process of law. The Supreme Court of the United States held that the court could not find that the form of protection (human flagman) required by the Memphis ordinance was, in the light of modern inventions, so wholly useless and obsolete as to say with absolute certainty that its enforcement lacked due process of law.

There is nothing in this to the effect that flagmen cannot be replaced by automatic signals. The importance of the case to the railroads arises from the fact that old ordinances should be replaced by new ones which authorize the railroads to modernize their highway crossing protection, before the installations are made. The fact that the city authorities of Memphis approved these signals and encouraged the railroads to

install them did not set aside the old ordinance. In numerous articles published from time to time in the *Railway Age* descriptions have been presented of installations of electrically-operated highway crossing signals replacing human flagmen and manually operated gates. Adequate proof is, therefore, available that modern types of protection not only provide greater safety, but also reduce the cost of operation. The Memphis case need not, therefore, discourage the railroads and local authorities in their efforts to provide better crossing protection, but it should emphasize the necessity for the revision of local ordinances to comply with the new conditions.

Railway and Barge Line Wages

THE government of the United States, by becoming, through the Inland Waterways Corporation, the owner and operator of a barge line on the Mississippi river system, has engaged in direct competition with the railways. By the policy it has adopted in establishing joint rail-water routes and rates it is forcing the railways to help the barge line to take traffic from themselves and reduce their earnings. In order to divert traffic from the railways it is making the freight rates charged by it so low that, including interest upon its investment in the barge line, it is incurring a large annual deficit which is being defrayed from taxes paid by the people of the United States. The ostensible purpose of all this is to demonstrate that private enterprise could engage successfully in carrying freight on inland waterways.

When the government embarks upon a policy of thus competing with an industry in which private capital is invested, all the costs incurred by it should be fully reported and carefully scrutinized in order that it may be determined whether its management of business is sound in all respects and fair to all concerned. The cost of labor constitutes almost two-thirds of the operating expenses of the railways. A large part of the wages paid by the railways have been fixed by arbitration boards created by a federal law, upon which representatives of the public have held the balance of power. All the other wages now paid by the railways are largely the result of action taken by the Railroad Administration, under government control, and subsequently by the Railroad Labor Board, which was a government tribunal. It has never been claimed by the Interstate Commerce Commission or any important public man or official of the government that railway wages are too high. The level of wages which has pre-

vailed since the war has been the principal reason why it has been necessary for the railways to charge the freight rates that have since prevailed.

If the wages being paid by the railways are reasonable, then the freight rates they make necessary are reasonable. If the wages being paid by the railways are reasonable, then any lower wages paid by the government for similar work must be unreasonably low. If the Inland Waterways Corporation, which is merely a branch of the government, is being enabled to make freight rates lower than those of the railways partly because it is paying unreasonably low wages, it is both treating its employees unfairly and engaging in unfair competition with the railways. We have heard much said to the effect that the prosperity that has prevailed in the United States within recent years has been due to the high wages paid in our industries. Obviously, if this is true, and if the government, when it engages in business, will pay lower wages than competing private industries, the tendency of the government engaging in business must be to undermine the country's prosperity.

For the purpose of ascertaining what kind of an employer the government is, when it engages in competition with a private industry, the *Railway Age* has secured data regarding the compensation paid by the Inland Waterways Corporation in 1927 to its various classes of employees. In an accompanying table we present this data and comparative data showing the compensation paid in the same year by the southwestern railways to persons doing similar work the wages of which, because of their location, are fairly comparable with those paid by the barge line.

It will be seen that, with the exception of mechanics and carpenters, the barge line paid lower average wages to every class of its employees than the railways paid to employees doing similar work. For 6,241,292 hours of work the barge line paid \$2,460,668 in wages, whereas for an equal number of hours of work of similar kinds the railways paid \$3,178,723, or \$718,055 more. The barge line had to bear the expense of boarding its crews, and its report shows that in 1927 it made expenditures for food supplies of \$118,872. Adding this to the wages actually paid makes the total constructive wages paid by the barge line \$2,575,583. The railways paid \$599,183 in excess of this for an equal amount of similar labor, or over 23 per cent more.

In the report of the Inland Waterways Corporation for 1927 there appeared a statement to the effect that "the approximate total savings to the public on tonnage transported by the Mississippi-Warrior service during 1927" was \$2,303,000. This included no allowance for the interest paid by the public upon the government's investment in the barge line, which amounted to approximately \$1,000,000. It included no allowance for

Barge Line and Southwestern Railway Wages, 1927

	Hours worked by barge line employees	Barge line wages per hr.	Wages paid by barge line	Railway wages per hour	Barge line wages at rail rates	Barge line wage savings
Officers	156,456	\$1.32	\$206,522	\$1.75	\$273,798	\$67,276
Chief clerks	47,607	0.90	42,846	0.93	44,275	1,429
Other clerical and office help	938,761	0.55	516,319	0.57	535,094	18,775
Warehouses, wharf foremen and freight handlers	2,974,671	0.37	1,100,628	0.43	1,279,109	178,481
Watchmen	174,180	0.24	41,803	0.35	60,963	19,160
Line vessel employees, captains and mates*	307,755	0.60	184,653	0.83	255,437	70,784
Engineers, firemen, coal passers, etc.**	694,406	0.31	215,266	0.53	368,035	152,769
Mechanics and carpenters	5,206	0.76	3,957	0.76	3,957	—
Common laborers	733,606	0.16	117,377	0.38	278,770	161,393
Cooks, waiters and maids	208,644	0.15	31,297	0.38	79,285	47,988
	6,241,292		\$2,460,668		\$3,178,723	\$718,055

* Compensation of line vessel employees, captains and mates is compared with compensation of railway conductors in freight service; compensation of engineers, firemen, coal passers, etc., is compared with compensation of railway power plant engineers, firemen and oilers; other barge line employee classifications have corresponding railway classifications.

taxes, which, if they had been as high in proportion to its total earnings as those of the railways, would have amounted to \$380,000. The wages paid, if they had been as high per hour as those paid by the railways for similar work, would have been, as we have seen, \$599,000 greater than they were. These three items aggregate almost \$2,000,000, or about 86 per cent of the "total savings to the public" claimed.

It may be said that one of the advantages of transportation by inland waterways is that it is cheaper than transportation by rail because it is not necessary, as indicated by the experience of the Inland Waterways Corporation, for carriers by water to pay as high wages for similar work as carriers by rail. This may be an advantage from the standpoint of the shipper, but it clearly is not an advantage from the standpoint of working men, and especially from the standpoint of railway employees. The payment of low wages by water carriers may help to make possible low freight rates by water; but low freight rates by water tend to either force down railway freight rates or to divert traffic from the railways, and thus, in either event, to reduce the wages the railways can afford to pay. And, if it is to be held that the payment of low wages by water carriers is desirable, what should be said of the claim that the payment of high wages by the railways and other industries is desirable? Is transportation by water, especially when conducted by the government, so different from all other forms of industry that the payment of low wages by water carriers is desirable, while the payment of high wages by other kinds of industry is undesirable?

Grade-Marked Ties

ONE of the outstanding developments in modern merchandising is the growing appreciation of the fact that the consumer will buy a product more readily which bears the manufacturer's trademark as a guarantee that he stands behind it, than one not so marked. Such names as Silvertown, Frigidaire and Duco are household terms for integrity and quality. Not long ago, the lumber producers adopted the plan of grade-marking the output of approved mills so that the purchaser could be assured of the grade of lumber he secured. In an address before the National Association of Railroad Tie Producers, W. J. Burton, presented a similar suggestion regarding crossties. This suggestion is not new, for at least one large producer of ties has for several years identified all of his output by grade and placed his name thereon. Yet, this practice is still so novel as to warrant consideration.

From time immemorial, the purchase of crossties has been a battle of wits between the producer, who endeavored to secure as high a grade as possible from the inspector and the railway which endeavored to force it down. Even since we have had a uniform specification, there has been such a wide variation in the inspection as to result in an unstable condition.

The grade marking of his ties by the producer and the fixing of the identity thereon in some permanent form will do more than any other single measure to raise the standards of crosstie production. The production of ties is passing rapidly from the hands of small concerns to a limited number of larger producers who have heavy investments in their business and who expect to remain in it for years to come. Such con-

cerns will not willingly identify inferior products in such a way that they can be traced back to them in the future. Furthermore the grading of ties will greatly simplify the problems of the railways in the purchase of ties for it will eliminate the necessity for other than casual inspection and will make unnecessary the large and expensive inspection service now maintained.

In some quarters it has been reported that the railways have not shown the same interest in grade-marked lumber as other users, because of their feeling that grade marking decreases their ability to drive sharp bargains. The same attitude will undoubtedly be found towards grade-marked ties. However, any advantage that is gained by "shading" grades in one transaction will be lost many times over in undetected deviations in other purchases. Grade marking will go far towards stabilizing quality, the benefit from which will accrue directly to the railways. The railways can hasten this advantage by encouraging producers to "grade mark" their ties and by indicating a preference for ties so marked.

Are Railway Unionists Waterway Advocates?

PROBABLY they are not, but "Labor," their official publication, apparently thinks they are. We base our conclusion on an editorial entitled "Uncle Sam Prepares to Use His Rivers," which appeared in the April 27 issue of that journal. This editorial takes its theme from the 1928 annual report of the Inland Waterways Corporation in which a "net profit" for the year is claimed. The point of view of the editorial is wholly one of approval and satisfaction at the promise of the waterways "to become freight carriers on a gigantic scale". The editors of Labor, we may assume, know full well that every ton of freight the waterways handle they take from the railways and that every time the railways lose 700 or 800 net tons of freight one less train moves over the rails; and that every train which fails to move means fewer railway employees.

Of every dollar railways receive, their employees get almost one-half. They do not get a cent from the receipts of the government-owned barge line. If Labor, therefore, were really serving the interests of those who support it, it would be pointing out the fallacy of the "profits" claimed by the government barge line, when compared with the usual understanding of that term. It would be asking that the accounting for this line be put upon a basis comparable with privately-owned transportation companies. It would seek the levying of a fair toll for the use of a right-of-way by water constructed by the taxpayers at enormous expense. In short, if Labor were serving the legitimate interest of its supporters, it would be seeking in very fair way to have the waterways placed on a basis where the railroads might compete with them upon an equitable basis. But no; Labor is so committed to government ownership of transportation facilities that it rides that hobby regardless of the certainty that the waterway projects, if pursued on a large scale, will cost many railroad men their jobs, to say nothing of removing a large share of the burden of transportation costs from shippers and placing it upon the taxpayers. We wonder how many organized railway employees share the enthusiasm of their official publication for waterway expansion.

Locomotive Performance and Operating Costs

A study of the interrelation of tonnage, rate of fuel consumption and speed—How other variables affect unit costs

By A. F. Stuebing

Chief Engineer, The Bradford Corporation, New York

Part II

THE preceding part of this article presented basic data on locomotive performance for the purpose of showing how from a knowledge of certain characteristics the cost of fuel and wages can be calculated. As was pointed out in connection with Table III, these figures would be modified by various factors which are encountered under normal operating conditions. The fundamental information as set forth in the tables and charts is applicable to the analysis of a wide range of problems concerning the operation of locomotives and trains, bearing on both the cost of operation and the capacity to move traffic.

Thus far the discussion has dealt with only two items of expense, fuel and wages of train crews. While these are among the most important factors, there is no justification for any assumption that operating expenses will be lowest under the conditions which bring the sum of these two items to the minimum. The charts of the combined cost of fuel and wages show that under certain conditions there are relatively small variations in cost over a considerable range of speed, tonnage or rate of firing. Consequently, it is not unlikely that the increase or decrease of some of the smaller items of expense within that range may determine the point where operating expenses are at the minimum.

To illustrate the method by which data on locomotive fuel consumption, tonnage and speed can be applied to actual operating conditions, details of the principal items of expense will be worked out for a level division 100 miles long.

One of the factors which has an important effect on the cost of operation is the time lost in train delays, due to stopping for coal and water, waiting for superior trains, etc. The time lost of course varies, depending on the track facilities and density of traffic, the speed and even the capacity of the tender. On lines which have light traffic, slow trains do not encounter many delays; on the other hand, on a busy double track slow trains are obliged to take the sidings much more frequently than the lighter trains which approach more nearly the speed of manifest freight and passenger trains. In any careful analysis of actual operating costs, the time lost in delays should be determined for each speed considered. In general, delays are roughly proportional to running time. For the purpose of these calculations the time lost has been taken as 25 per cent of the running time, this including delays at terminal yards as well as on the line. The speed between terminals corresponding to the various average running speeds will therefore be as follows:

Running speed, m.p.h. 10 12½ 15 20 25 30
Speed between terminals, m.p.h. 8 10 12 16 20 24

The cost of the wages of the train crew will be increased to correspond to the decrease in speed.

Aside from their effect on crews' wages, road delays also increase the fuel consumption, the loss amounting to about 600 lb. per hour for the locomotive in question. Ordinarily the locomotive becomes cool between trips and to obtain the total fuel consumption it is necessary to add for each trip the quantity of coal required to raise steam, which, in this case, is 3,000 lb.

Coal Consumption Due to Stops

Each time the train is brought up to its running speed extra coal is consumed to accelerate the locomotive and its trailing load. An approximate determination of the amount of fuel required for this purpose can be arrived at from the fundamental equation for acceleration in conjunction with the data charted in Fig. 3.

The time required to change a mass of one ton from one speed to another is expressed by the equation

$$t = 91.2 \frac{V_2 - V_1}{P}$$

Adding five per cent for the energy of rotation of wheels and axles, this becomes

$$t = 95.6 \frac{V_2 - V_1}{P}$$

Where t = time in seconds
 V_1 = initial speed, in miles per hour
 V_2 = final speed in miles per hour
 P = force producing acceleration, in pounds.

From Fig. 3 it is possible to ascertain the tractive force available over the range of speed under consideration with any assumed limit on the maximum rate of firing. By calculating the resistance of the train from the data in Table I, the net force available for acceleration can be found. The equation above then gives the time of acceleration. From the rate of coal consumption, also determined from Fig. 3, the coal used for acceleration can be computed. As an ex-

Table V—Coal Used in Acceleration

Train Weight, 5,000 Tons Behind Tender	0-5	5-10	10-15	15-20	20-25	25-30
Speed interval, m.p.h.	61,400	61,400	55,000	50,000	42,500	35,500
Tractive force, lb.	19,250	19,625	20,500	22,000	24,000	26,250
Train resistance, lb.	42,150	41,775	34,500	28,000	18,500	9,250
Force of acceleration, lb.	59.3	59.9	72.5	89.4	135.0	270.0
Time of acceleration, sec.						
Rate of coal consumption, lb. per hr.	1,600	4,200	7,100	9,500	10,000	10,000
Coal per hr. for acceleration, lb.	1,110	2,860	4,450	5,320	4,350	2,610
Coal used for acceleration, lb.	18.3	47.6	89.6	132.2	163.0	196.0
Cumulative total	18.3	65.9	155.5	287.8	450.7	646.7

ample of the application of this method the calculations for a train of 5,000 tons behind the tender, or 5,222 tons including the locomotive and tender, are shown in Table V.

The amount of coal required to accelerate the train may be unimportant when the speed is low, but at higher speeds it becomes a larger proportion of the total. To haul a 5,000-ton train over the division at 30 miles an hour would require about 24,000 lb. of coal. If the train made three stops en route, the coal used for

acceleration would be 2,580 lb., or 10.7 per cent. If the speed was 15 m.p.h., the coal consumption would be about 15,500 lb. for the trip. The slower train would be likely to make more stops; in this case, the number will be assumed as five. The coal used for acceleration would therefore be 930 lb., or 6 per cent of that used purely for hauling.

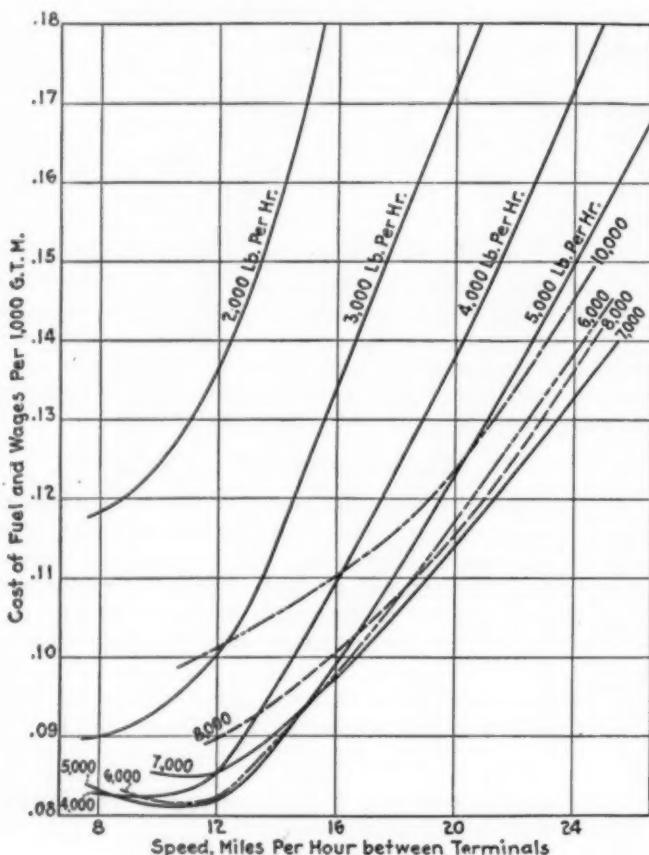


Fig. 12—Cost of Fuel and Wages for Assumed Operating Conditions

For the purpose of this analysis the amount of coal consumed in accelerating the train will be taken as a percentage of that used for hauling, varying with the running speed as follows: 10 m.p.h., 3 per cent; 15 m.p.h., 6 per cent; 20 m.p.h., 7.5 per cent; 25 m.p.h., 9 per cent, and 30 m.p.h. 10.7 per cent.

Cost of Fuel and Wages

The detailed calculations for the cost of fuel and wages under the conditions outlined above are given in Table VI. The combined cost of the two items is also presented graphically in Fig. 12. Comparison of this chart with Fig. 9 brings out the general similarity of the relation between the lines for the low and high rates of firing. At the medium rates some changes are found, however. Rates of 5,000 lb. and 6,000 lb. of coal an hour give approximately the same unit costs between 10 and 15 m.p.h. At higher speed the cost reaches the minimum at a rate of 7,000 lb. an hour. There is little change in the speed at which the lowest cost is found, this being about 11 m.p.h. in both cases, but under the condition of continuous operation this corresponded to a fuel rate of 4,000 lb. per hour, whereas the effect of standby losses, etc., brings the minimum at a rate of 6,000 lb. per hour under the assumed conditions of operation.

Another item of expense which is affected by speed

is the fixed charge for interest, depreciation and taxes. To determine this, the ton-miles that can be handled per month must first be calculated. This is an index of the amount of traffic that can be moved under varying conditions of loading and speed and is important

Table VI—Cost of Fuel and Wages Under Assumed Operating Conditions

	2,000 LB. OF COAL AN HOUR	3,000 LB. OF COAL AN HOUR	4,000 LB. OF COAL AN HOUR	5,000 LB. OF COAL AN HOUR	6,000 LB. OF COAL AN HOUR	7,000 LB. OF COAL AN HOUR	8,000 LB. OF COAL AN HOUR
Speed between terminals, m.p.h.	8	12	16	20	24		
Delayed time, hrs.	2.5	1.67	1.25	1.00	.83		
Time between terminals, hrs.	12.5	8.33	6.25	5.00	4.17		
Cost of wages per 1,000 g.t.m.	0.0702	0.0783	0.1202	0.1800	0.2910		
Coal used running, lb.	20,000	13,330	10,000	8,000	6,670		
Coal used for acceleration	600	800	750	720	710		
Coal for firing up and delays	4,500	4,000	3,750	3,600	3,500		
Total coal per trip	25,100	18,130	14,500	12,320	10,880		
Coal per 1,000 g.t.m.	36.9	44.7	57.1	72.5	103.5		
Cost of coal per 1,000 g.t.m.	0.0480	0.0581	0.0742	0.0943	0.1345		
Cost of fuel and wages	0.1182	0.1364	0.1944	0.2743	0.4255		
Speed between terminals, m.p.h.	8	12	16	20	24		
Delayed time, hrs.	2.5	1.67	1.25	1.00	.83		
Time between terminals, hrs.	12.5	8.33	6.25	5.00	4.17		
Cost of wages per 1,000 g.t.m.	0.0459	0.0483	0.0725	0.1007	0.1390		
Coal used running, lb.	30,000	20,000	15,000	12,000	10,000		
Coal used for acceleration	900	1,200	1,125	1,080	1,070		
Coal for firing up and delays	4,500	4,000	3,750	3,600	3,500		
Total coal per trip	35,400	26,200	19,875	16,680	14,570		
Coal per 1,000 g.t.m.	34.0	39.9	47.2	55.0	66.8		
Cost of coal per 1,000 g.t.m.	0.0442	0.0519	0.0614	0.0715	0.0869		
Cost of fuel and wages	0.0901	0.1004	0.1339	0.1722	0.2259		
Speed between terminals, m.p.h.	8	12	16	20	24		
Delayed time, hrs.	2.5	1.67	1.25	1.00	.83		
Time between terminals, hrs.	12.5	8.33	6.25	5.00	4.17		
Cost of wages per 1,000 g.t.m.	0.0369	0.0369	0.0535	0.0728	0.0968		
Coal used running, lb.	40,000	26,670	20,000	16,000	13,330		
Coal used for acceleration	1,200	1,600	1,500	1,440	1,430		
Coal for firing up and delays	4,500	4,000	3,750	3,600	3,500		
Total coal per trip	45,700	32,270	25,250	21,040	18,260		
Coal per 1,000 g.t.m.	35.3	37.4	44.3	50.2	57.8		
Cost of coal per 1,000 g.t.m.	0.0459	0.0486	0.0576	0.0653	0.0751		
Cost of fuel and wages	0.0828	0.0855	0.1111	0.1381	0.1719		
Speed between terminals, m.p.h.	8	12	16	20	24		
Delayed time, hrs.	2.5	1.67	1.25	1.00	.83		
Time between terminals, hrs.	12.5	8.33	6.25	5.00	4.17		
Cost of wages per 1,000 g.t.m.	0.0330	0.0314	0.0441	0.0588	0.0772		
Coal used running, lb.	50,000	33,330	25,000	20,000	16,670		
Coal used for acceleration	1,500	2,000	1,870	1,800	1,780		
Coal for firing up and delays	4,500	4,000	3,750	3,600	3,500		
Total coal per trip	56,000	39,330	30,620	25,400	21,950		
Coal per 1,000 g.t.m.	38.7	38.7	44.2	48.9	55.5		
Cost of coal per 1,000 g.t.m.	0.0503	0.0503	0.0575	0.0635	0.0722		
Cost of fuel and wages	0.0833	0.0817	0.1016	0.1223	0.1494		
Speed between terminals, m.p.h.	10	12	16	20	24		
Delayed time, hrs.	2.00	1.67	1.25	1.00	.83		
Time between terminals, hrs.	10.0	8.33	6.25	5.00	4.17		
Cost of wages per 1,000 g.t.m.	0.0289	0.0284	0.0387	0.0511	0.0660		
Coal used running, lb.	48,000	40,000	30,000	24,000	20,000		
Coal used for acceleration	2,160	2,400	2,250	2,160	2,140		
Coal for firing up and delays	4,200	4,000	3,750	3,600	3,500		
Total coal per trip	54,360	46,400	36,000	29,760	25,640		
Coal per 1,000 g.t.m.	41.1	41.3	45.7	50.0	55.4		
Cost of coal per 1,000 g.t.m.	0.0534	0.0537	0.0594	0.0650	0.0720		
Cost of fuel and wages	0.0823	0.0821	0.0981	0.1161	0.1380		
Speed between terminals, m.p.h.	10	12	16	20	24		
Delayed time, hrs.	2.00	1.67	1.25	1.00	.83		
Time between terminals, hrs.	10.0	8.33	6.25	5.00	4.17		
Cost of wages per 1,000 g.t.m.	0.0279	0.0268	0.0354	0.0466	0.0603		
Coal used running, lb.	56,000	46,670	35,000	28,000	23,330		
Coal used for acceleration	2,560	2,800	2,620	2,520	2,500		
Coal for firing up and delays	4,200	4,000	3,750	3,600	3,500		
Total coal per trip	60,760	53,470	41,370	34,120	28,330		
Coal per 1,000 g.t.m.	44.3	45.0	47.8	52.0	55.9		
Cost of coal per 1,000 g.t.m.	0.0576	0.0585	0.0621	0.0676	0.0727		
Cost of fuel and wages	0.0855	0.0853	0.0975	0.1142	0.1330		
Speed between terminals, m.p.h.	12	16	20	24			
Delayed time, hrs.	1.67	1.25	1.00	.83			
Time between terminals, hrs.	8.33	6.25	5.00	4.17			
Cost of wages per 1,000 g.t.m.	0.0258	0.0336	0.0437	0.0566			
Coal used running, lb.	53,330	40,000	32,000	26,670			
Coal used for acceleration	3,200	3,000	2,880	2,850			
Coal for firing up and delays	4,000	3,750	3,600	3,500			
Total coal per trip	60,530	46,750	38,480	33,20			
Coal per 1,000 g.t.m.	49.0	51.5	55.0	61.2			
Cost of coal per 1,000 g.t.m.	0.0637	0.0670	0.0715	0.0795			
Cost of fuel and wages	0.0895	0.1006	0.1152	0.1361			
Speed between terminals, m.p.h.	12	16	20	24			
Delayed time, hrs.	1.67	1.25	1.00	.83			
Time between terminals, hrs.	8.33	6.25	5.00	4.17			
Cost of wages per 1,000 g.t.m.	0.0251	0.0320	0.0412	0.0535			
Coal used running, lb.	66,670	50,000	40,000	33,330			
Coal used for acceleration	4,000	3,750	3,600	3,560			
Coal for firing up and delays	4,000	3,750	3,600	3,500			
Total coal per trip	74,670	57,500	47,200	40,390			
Coal per 1,000 g.t.m.	58.8	60.0	63.6	70.7			
Cost of coal per 1,000 g.t.m.	0.0765	0.0780	0.0827	0.0920			
Cost of fuel and wages	0.1016	0.1100	0.1239	0.1455			

when the objective is maximum traffic movement rather than minimum cost.

Statistics of locomotive operation show that service

able locomotives actually operate about 30 per cent of the time and are idle 70 per cent, making as an average about 2,550 miles per month. The idle time includes not alone the time the locomotive is undergoing running repairs, but takes in also the time spent on the ash pit, awaiting call and being prepared for the trip. The effect of variations in speed, tonnage and rate of firing on the time spent at terminals is difficult to evaluate on any general basis. It is generally recognized that some locomotives when loaded to maximum capacity develop mechanical troubles which increase the time that they must be held for repairs. In other cases similar trouble develops if the operating speed is too high. Such effects are chargeable to the design of the class of power involved and can only be dealt with as individual cases. If a locomotive is handling light tonnage, turn-around trips may be made without going to the enginehouse, thereby increasing greatly the monthly mileage.

Except for some special cases, such as those mentioned, the time at terminals is practically unaffected by variations in operating conditions. For the calculations in this article the time that the locomotive is idle after each trip is assumed to be 16 hours. On this basis the time per trip, the number of trips per month and the ton-miles per month have been determined. The calculations are shown in Table VII, and the data for tonnage moved have been plotted in Fig. 13.

Examination of the curves brings out the constant, though not uniform, increase in traffic movement at any fixed speed with each increase in the rate of firing. The maximum ton-miles per month for all rates of firing is produced at the lowest speed. Almost the same amount of traffic can be handled at rates of 5,000 lb. to

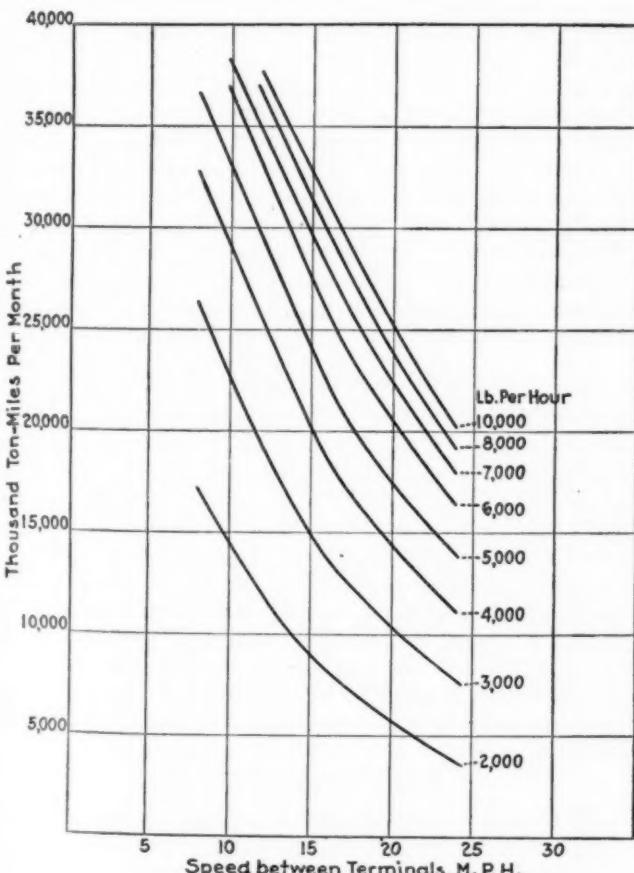


Fig. 13—Ton-Miles per Month at Varying Speeds and Rates of Firing

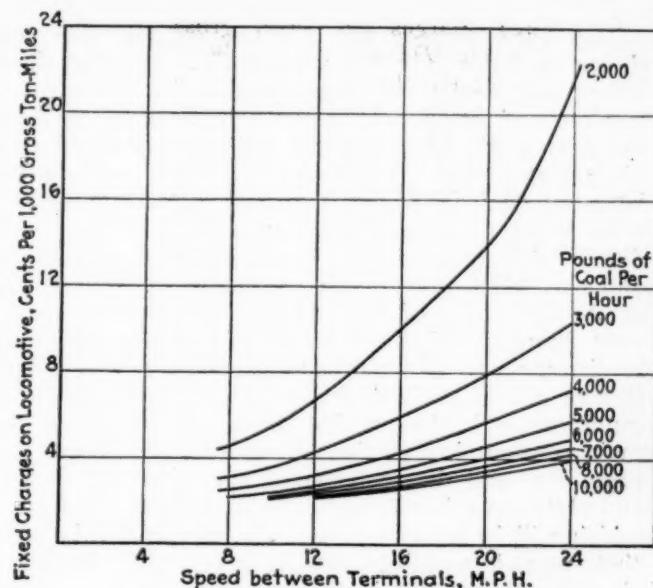


Fig. 14—Fixed Charges at Varying Speeds and Rates of Firing

10,000 lb. of coal an hour by keeping to the maximum tonnage in each case. It is of interest to note that the speed and rate of firing which show the lowest combined cost of fuel and wages also develop nearly the maximum ton-miles per month. At the higher speeds,

Table VII—Ton-Miles per Month and Fixed Charges

2,000 L.B. OF COAL AN HOUR	
Speed between terminals, m.p.h...	8 12 16 20 24
Time per locomotive trip, hrs...	28.5 24.33 22.25 21.0 20.17
Trips per month	25.3 29.6 32.4 34.3 35.7
Thousand ton-miles per month...	17,200 12,050 8,230 5,830 3,750
Fixed charges per 1,000 g.t.m...	0.0473 0.0675 0.0988 0.139 0.217
3,000 L.B. OF COAL AN HOUR	
Time per locomotive trip, hrs...	28.5 24.33 22.25 21.0 20.17
Trips per month	25.3 29.6 32.4 34.3 35.7
Thousand ton-miles per month...	26,300 19,450 13,650 10,400 7,850
Fixed charges per 1,000 g.t.m...	0.0309 0.0418 0.0596 0.0782 0.1035
4,000 L.B. OF COAL AN HOUR	
Time per locomotive trip, hrs...	28.5 24.33 22.25 21.0 20.17
Trips per month	25.3 29.6 32.4 34.3 35.7
Thousand ton-miles per month...	32,800 25,600 18,500 14,400 11,300
Fixed charges per 1,000 g.t.m...	0.0248 0.0318 0.0440 0.0565 0.0720
5,000 L.B. OF COAL AN HOUR	
Time per locomotive trip, hrs...	28.5 24.33 22.25 21.0 20.17
Trips per month	25.3 29.6 32.4 34.3 35.7
Thousand ton-miles per month...	36,600 30,000 22,500 17,800 14,100
Fixed charges per 1,000 g.t.m...	0.0222 0.0251 0.0361 0.0457 0.0577
6,000 L.B. OF COAL AN HOUR	
Speed between terminals, m.p.h...	10 12 16 20 24
Time per locomotive trip, hrs...	26.0 24.33 22.25 21.0 20.17
Trips per month	27.7 29.6 32.4 34.3 35.7
Thousand ton-miles per month...	36,600 33,200 25,600 20,500 16,500
Fixed charges per 1,000 g.t.m...	0.0222 0.0245 0.0318 0.0397 0.0492
7,000 L.B. OF COAL AN HOUR	
Time per locomotive trip, hrs...	26.0 24.33 22.25 21.0 20.17
Trips per month	27.7 29.6 32.4 34.3 35.7
Thousand ton-miles per month...	38,000 35,200 28,050 22,500 18,100
Fixed charges per 1,000 g.t.m...	0.0214 0.0231 0.0290 0.0361 0.0449
8,000 L.B. OF COAL AN HOUR	
Time per locomotive trip, hrs...	24.33 22.25 21.0 20.17
Trips per month	29.6 32.4 34.3 35.7
Thousand ton-miles per month...	36,600 29,450 24,000 19,300
Fixed charges per 1,000 g.t.m...	0.0222 0.0276 0.0339 0.0421
10,000 L.B. OF COAL AN HOUR	
Time per locomotive trip, hrs...	24.33 22.25 21.0 20.17
Trips per month	29.6 32.4 34.3 35.7
Thousand ton-miles per month...	37,600 31,000 25,500 20,400
Fixed charges per 1,000 g.t.m...	0.0216 0.0262 0.0319 0.0398

however, the rate at which the cost is lowest does not approach the maximum capacity for traffic movement.

For calculating the fixed charges rates have been assumed as follows: Interest, 6 per cent; depreciation, 5 per cent, and taxes 2 per cent, a total of 13 per cent. At present prices a locomotive such as has been considered costs approximately \$60,000, making the annual fixed charges \$7,800 per year. In applying the figures for ton-miles per month to obtain the charge on the basis of traffic units, allowance has been made for 15 per cent of the locomotive time which is normally spent in the shop for classified repairs.

The fixed charges per 1,000 gross ton-miles are shown in Table VII and also in Fig. 14. The chart brings out clearly the large increase in this item at low rates of firing, especially when the speed is high. Comparing the fixed charges with the combined cost of fuel and wages, it is found that their ratio to the latter ranges from 22 per cent to 51 per cent, the maximum being found at the lower rates of firing. It is evident that this is one of the major items of expense and one which must receive attention in any analysis of the economics of operation. Under certain conditions, however, this fixed charge on the locomotive may be disregarded. If a railroad has enough motive power to take care of available traffic under varying operating conditions, it is obvious that the fixed charges will remain constant irrespective of variations in speed, tonnage, etc., and the economy of operation will depend entirely upon other factors. In the summary of costs which will be presented later the assumption is made that new locomotives are required and the fixed charges are included in the totals.

Water

The cost of water for road locomotives of Class I railroads amounted in 1927 to \$21,547,816, or 6.6 per cent of the cost of fuel in the same service. This item is too large to be neglected. While no information concerning water consumption has been presented in the basic data on locomotive performance, the figures can readily be obtained and can be applied with appropriate cost factors, as in the case of coal.

There is an important distinction between fuel cost and water costs which must be recognized in the analysis of locomotive operation. Fuel is purchased and the cost for the first ton is the same as for the last, barring fluctuations in price. Water, on the other hand,

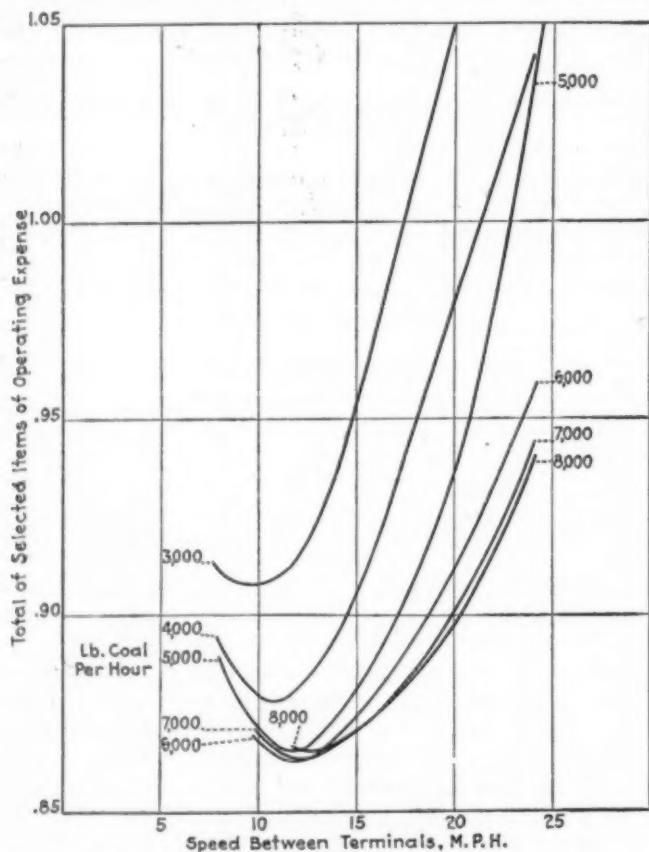


Fig. 15—Relation between Operating Expenses and Speed at Various Rates of Firing

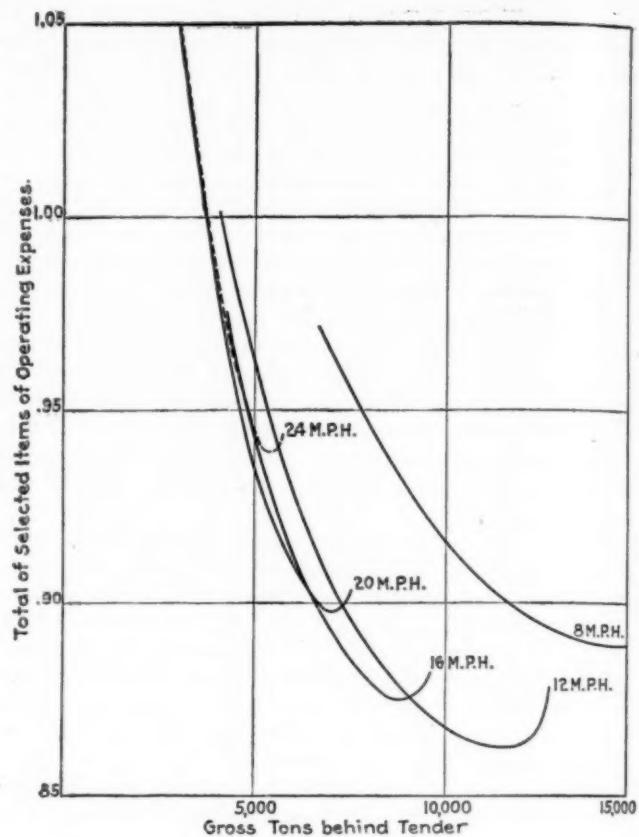


Fig. 16—Operating Cost with Varying Tonnage at Fixed Speed

is generally obtained from sources owned and operated by the railroad. A large proportion of the cost of supplying water is made up of items which do not vary whether the quantity furnished is increased or decreased, and therefore a reduction in water consumption may save only the cost of the fuel used for pumping. Under such circumstances it would not be correct to compare costs under different conditions of operation by charging for the water used in each case at the average unit cost. True comparisons could only be obtained by charging the marginal cost within the range of maximum and minimum consumption. This would ordinarily be negligible in comparison with the other factors considered and will, therefore, be disregarded.

Lubrication and Other Supplies

Considering these two items in their ratio to the cost of fuel, it is found that in 1927 the expenditures for lubrication amounted to 2.3 per cent, and for other supplies for locomotives 1.9 per cent of that for fuel in road service. Lubrication costs would probably be prorated on a mileage basis with fair accuracy. The cost of other supplies is likely to be more nearly proportional to the number of trips. Each item would be affected to some degree by variations in tonnage and speed, but since the amount involved is relatively small no attempt will be made in this analysis to take account of the fluctuations of cost under varying operating conditions.

Enginehouse Expenses

The major items included in this classification are unaffected by variations in tonnage and speed, being practically proportional to the number of trips. The total expenditures on Class I railroads in 1927 charged to enginehouse expenses, train, were \$79,898,209, which

is at the rate of .0638 cents per locomotive mile. In the absence of data on the average length of locomotive runs no definite figure can be obtained for the cost per trip. Assuming an average run of 125 miles, this would amount to \$7.97. Some data obtained in an investigation of long locomotive runs indicated that the average saving at terminals resulting from reducing the number of locomotives handled by one amounted to \$4.20. This covers the marginal expenses only, and, therefore, is not inconsistent with the average figures

Table VIII—Marginal Cost of Enginehouse Expenses per 1,000 G.T.M.

Speed, m.p.h.	10	12.5	15	20	25	30
2,000 lb. coal per hr.	0.0062	0.0103	0.0165	0.0247	0.040	
3,000 lb. coal per hr.	0.0040	0.0064	0.0099	0.0138	0.0191	
4,000 lb. coal per hr.	0.0032	0.0049	0.0074	0.0100	0.0133	
5,000 lb. coal per hr.	0.0029	0.0041	0.0061	0.0081	0.0106	
6,000 lb. coal per hr.	0.0032	0.0037	0.0053	0.0070	0.0091	
7,000 lb. coal per hr.	0.0031	0.0035	0.0049	0.0064	0.0083	
8,000 lb. coal per hr.	0.0034	0.0046	0.0060	0.0078		
10,000 lb. coal per hr.	0.0033	0.0044	0.0057	0.0074		

given above. In calculating costs under the conditions outlined earlier in this article, enginehouse expenses are included on the basis of \$4.20 per trip. The amount of this item under various conditions is shown in Table VIII.

Locomotive Repairs

Inasmuch as this is one of the largest items of expense, amounting to 13 per cent more than the cost of fuel for the Class I roads in 1927, it merits the most thorough study. Much data is available on the cost of repairs for various types of locomotives under average operating conditions. But when an attempt is made to analyze the effect of variations in speed and loading or rate of firing on repair costs, the meagerness of the information on that phase of the problem soon becomes apparent.

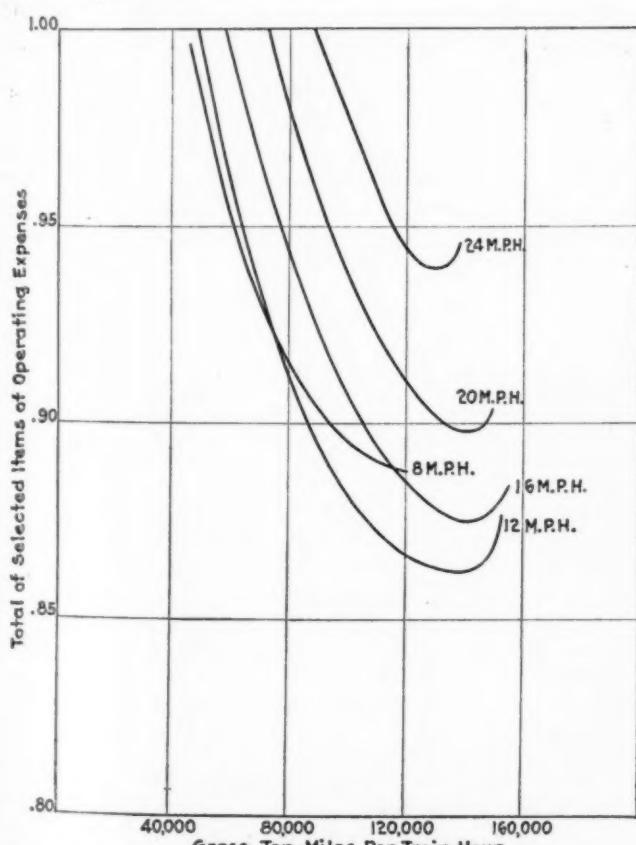


Fig. 17—Operating Costs at Constant Speed With Varying Ton-Miles per Hour

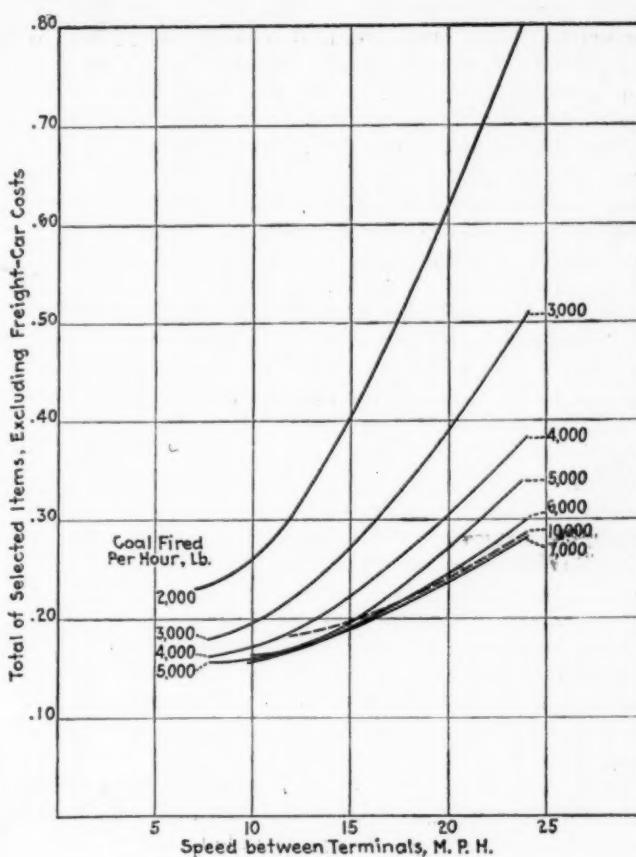


Fig. 18—Total of Selected Items Excluding Freight Car Costs, at Constant Rates of Firing

Even if complete data on costs were available for numerous classes of motive power, it is doubtful whether the effect of the factors mentioned would be uniform or consistent for different designs. The prevailing opinion seems to be that when locomotives are loaded to their maximum capacity the cost of repairs increases at a more rapid rate than the increase in tonnage. This applies particularly to the maintenance of the running gear and is especially noticeable on large locomotives which have high piston thrust and relatively small bearing area on pins and axles. When such conditions are found the cost of locomotive repairs on a ton-mile basis is probably less when lighter trains are handled. However, this cannot be accepted as holding true in all cases, for some locomotives of moderate size can be worked to capacity without any undue increase in maintenance.

The effect of variations in speed on the cost of repairs is likewise dependent on the design of the locomotive. If motive power with small driving wheels and heavy rods and reciprocating parts is used in high-speed service, the cost of maintaining the motion work is likely to be excessive, whereas a large-wheel engine would show little difference whether used on slow or fast freight.

There is undoubtedly an interrelation between the mechanical condition of the locomotive and the power and fuel consumption, which depends to some extent on the policy of the road in regard to the proportion of work done in general overhaulings and running repairs. In analyzing the distribution of expenditures it is found that some roads spend about 60 per cent on classified repairs and 40 per cent on running repairs, while on other roads the proportion may range up to 60 per cent for running repairs. If the locomotives

are kept in first class condition between shoppings, the efficiency may remain nearly uniform, but if they are run with the minimum of repairs between shoppings there is likely to be a constant increase in fuel consumption accompanied by a decrease in capacity. Attempts have been made to determine the difference in efficiency between a locomotive in the best of condition and a similar engine when ready for shopping but no definite relation has been established.

Considering the conditions which have just been mentioned, it seems evident that the determination of the operating conditions under which the cost of repairs will reach the minimum requires consideration of the construction of the locomotive and assignment to the proper territory and service as well as the selection of suitable tonnage.

While the effect of variations in speed on the cost of repairs cannot be determined, it is possible to evaluate one of the factors; namely, the effect of train resistance. As train resistance increases for each increase in speed, there is a corresponding increase in the work which the locomotive is required to do in producing a ton-mile, and, in consequence, the repair cost will be higher, whether the tonnage is heavy or light. Disregarding the indeterminate effect of other variables, this gives an opportunity to estimate repair costs on a reasonably logical basis.

The average cost of locomotive repairs on Class I railroads in 1927 was 26.9 cents per mile. Both steam and electric locomotives are included in the statistics but the latter are so few that their effect on the average is negligible. For the steam locomotives alone the average tractive force was 42,800 lb. The cost of repairs would normally increase at about one-half the ratio of the increase in tractive force, so for the locomotive considered in this analysis, it may be assumed as 33.2 cents per mile. This is the cost under average operating conditions which are taken as a speed of 12 miles an hour between terminals and a rate of firing of 4,000 lb. an hour. Under these conditions the locomotive would haul 8,640 tons, and the cost per 1,000 gross ton-miles would be 3.84 cents. Varying this in proportion to the train resistance, the cost for the various speeds between terminals would be as follows:

Speed, m.p.h.	8	10	12	16	20	24
Repairs per 1,000 g.t.m...	\$0.0352	\$0.0366	\$0.0384	\$0.0421	\$0.0457	\$0.0503

Freight Car Operating Costs

The speed at which trains are operated affects the tonnage handled per car. Therefore, to determine the most economical speed it is necessary to ascertain the cost of operating freight cars and the amount by which this cost is increased or decreased under the assumed conditions.

From the statistics for 1927 it is found that the average number of freight cars on line was 2,509,495, and the total carloads 68,518,951. Each car, therefore, made 27.3 trips in the year, the average time per trip being 13.4 days. The average daily mileage was 30.3 making the mileage per trip 406. The average speed was 12.3 miles an hour, and the time spent in trains en route 1.37 days, the idle time being 12.03 days. Under these conditions the ton-miles per day were 518 net or 1,185 gross. The idle time is practically unaffected by changes in train speed. Assuming that it remains constant, the gross ton-miles per car per day can be calculated for any assumed train speed.

If the number of freight cars owned by a railroad is so great that those returned to the home line, with

whatever foreign cars the road finds it desirable to load for delivery to connecting lines, take care of all requirements, no immediate benefit from the standpoint of freight-car expense would result from an increase in freight train speed. However, if it became necessary to handle heavier traffic, more rapid movement would reduce the number of cars that the road would need to hire or buy. On the other hand, if foreign cars which would not otherwise be on the line must be used to handle traffic, an increase in train speed would reduce the number required, thereby effecting a saving in per diem expense.

Considering the railroads of the country as a whole, the number of cars provided must be sufficient to care for the requirements of shippers at whatever rate of movement the roads are able to maintain. This is the condition which will be considered in the comparison of freight car operating costs.

The number of loads and trips may be considered as constant. The time running per trip, in days, will be 406 divided by 24 times the running speed. Adding to this 12.03 days idle time gives the time per trip, which is divided into 406 to get the miles per day. Multiplying by 39.1, the average gross tons per car gives the gross ton-miles per car per day.

The available statistics on the cost of freight cars show that the weighted average cost in 1927 was \$2,060. Allowing 6 per cent for interest, 4 per cent for depreciation and 2 per cent for taxes, brings the fixed charges to \$247.20 a year. The cost of repairs per freight car in 1927 amounted to \$146.50. The part of this expense which is caused by starting, stopping and running, and loading and unloading would not be affected by the number of cars used to handle the traffic. The repairs necessitated by running would be increased at the higher speeds but the variation would be slight and will be disregarded. The amount of repairs due to the

Table IX—Freight-Car Operating Costs at Various Speeds

Operating speed, m.p.h.	8	10	12	16	20	24
Days running per trip	2.11	1.69	1.41	1.06	.846	.704
Total days per trip	14.14	13.72	13.44	13.09	12.876	12.734
Miles per car per day	28.7	29.6	30.2	31.0	31.6	31.9
Gross ton-miles per car per day	1,121	1,158	1,180	1,213	1,235	1,246
Cost per 1,000 g.t.m.	0.731	0.708	0.695	0.676	0.664	0.659

action of time and the elements will increase in proportion to the number of cars. In a study conducted several years ago, this was found to be 30.1 per cent of the total cost of repairs, which for 1927 would amount to \$44.10. The annual cost of one additional freight car would, therefore, be \$247.20 plus \$44.10, or \$291.30, making the daily cost 82 cents. Dividing this amount by the figure already obtained for gross ton-miles per car per day at various speeds gives the cost on a ton-mile basis. The calculations are shown in Table IX.

This tabulation brings out clearly the fact that a considerable increase in operating speed results in but a slight gain in car mileage and in ton-miles per car per day, showing that major improvements in car performance must be effected not by speeding up freight trains, but by reducing the time the car is lying idle. Another feature to be noted is the magnitude of this item which, under the majority of operating conditions considered, is several times as much as the combined cost of fuel and wages. The relative values of these items for the railroads as a whole would be different; first, because the great majority of freight cars were bought at prices far lower than those now prevailing, and, second, because the fuel and wage costs in this analysis are calculated for a water-level line.

Maintenance of Way

The analysis of maintenance of way expenses to determine the effect of tonnage and speed presents difficult problems in the apportionment of charges between freight and other services and between locomotives and cars. The principal item of expense under this classification which would be affected by the speed and tonnage of trains is track laying and surfacing, exclusive of yard tracks. The cost of renewals of rails and ties would probably be increased somewhat at the higher speeds, but due to lack of data these items will be disregarded.

Of the total expenses for maintenance of way and structures in 1927, 73.3 per cent was charged or apportioned to freight service. The amount charged to track laying and surfacing of other than yard tracks was \$193,533,759. As a rough approximation the ratio given above may be applied to determine the part of this cost assignable to freight service, which is found to be \$141,860,245.

The practice of apportioning track maintenance costs on the assumption that all expense is chargeable to the locomotive is probably far from accurate under present day conditions. With extremely heavy wheel loading and inadequate spring capacity, a loaded freight car may do as much damage to the track as a locomotive. For want of satisfactory data on this subject, the locomotive mile will be used as a basis for distributing the

Table X—Cost of Track Maintenance per 1,000 Gross Ton-Miles

Coal per hour, pounds	Train speed, m.p.h.					
	8	10	12	16	20	24
2,000	\$0.0300	\$.....	\$0.0521	\$0.0902	\$0.1345	\$0.227
3,000	0.0196	.....	0.0323	0.0524	0.0754	0.1082
4,000	0.0158	.....	0.0245	0.0387	0.0545	0.0754
5,000	0.0141	.....	0.0209	0.0318	0.0440	0.0601
6,000	.....	0.0157	0.0189	0.0280	0.0384	0.0515
7,000	.....	0.0152	0.0178	0.0256	0.0349	0.0470
8,000	.....	0.0171	0.0243	0.0327	0.0440	0.0515
10,000	.....	0.0167	0.0231	0.0309	0.0417	0.0515

expense. The total road mileage of locomotives in freight service in 1927 was 665,945,165, which brings the cost for the assigned proportion of the expense of track laying and surfacing to .213 cents per locomotive mile, at an average speed of 12.3 miles per hour.

A committee of the American Railway Engineering Association which investigated the effect of variations in train speed on the cost of track maintenance reported that one mile an hour increase in speed raised the cost about one per cent. Applying this factor, the cost per locomotive mile for the operating speeds considered is found to be as follows:

Speed, m.p.h.	8	10	12	16	20	24
Cost per locomotive mile	\$2.04	\$2.08	\$2.12	\$2.21	\$2.29	\$2.38

This cost, apportioned on a gross ton-mile basis for various rates of coal consumption, is shown in Table X.

The items for which costs have been computed under the assumed operating conditions; namely, fuel and wages, fixed charges on the locomotive, enginehouse expenses, locomotive repairs, freight-car expenses and track maintenance, include a large proportion of the expenses which vary with the factors of speed, tonnage and rate of firing. The totals of these items are shown in Table XI and in Figs. 15, 16 and 17.

From the curves of Fig. 15, it is evident that the lowest cost up to a speed of 13 m.p.h. is obtained at a rate of firing of 6000 lb. an hour, the minimum being at about 11 3/4 m.p.h. Between 13 m.p.h. and 16 m.p.h. a fuel rate of 7,000 lb. an hour gives the lowest cost, and at higher speeds 8,000 lb. an hour is slightly more

economical. To avoid confusion in the lines, the results for 10,000 lb. of coal an hour have not been plotted on this chart. By referring to Table XI, it will be noted that the costs at the maximum rate of firing are considerably greater than at 8,000 lb. an hour for the lower speeds, but only slightly more at 24 m.p.h. Another interesting point to note is that for each rate of

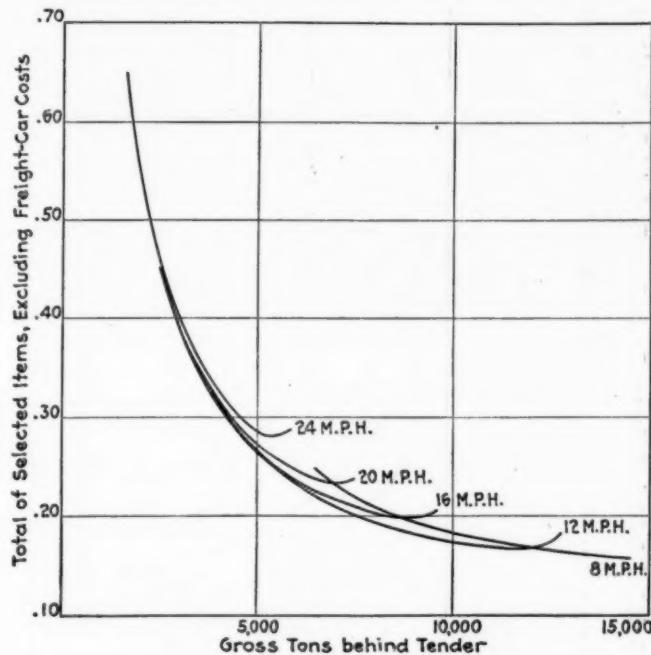


Fig. 19—Total of Selected Items, Excluding Freight-Car Costs, with Varying Tonnage at Fixed Speed

firing there is a definite speed at which the cost reaches the minimum and that this speed increases from 9 1/2 m.p.h. at 3,000 lb. an hour to 12 1/2 m.p.h. at 8,000 lb. an hour.

The curves of Fig. 16 show the operating costs at selected speeds with varying tonnage. A comparison of this chart with Fig. 10 brings out interesting differences. At a speed of 10 m.p.h. (corresponding to 8 m.p.h. in Fig. 16) the cost of fuel and wages alone with a train load of over 11,000 tons was less than at higher

Table XI—Total of Selected Items of Operating Expenses at Various Speeds and Rates of Firing

Coal per hour, pounds	Operating speed, m.p.h.					
	8	10	12	16	20	24
2,000	\$0.9679	\$.....	\$0.9997	\$1.1180	\$1.2822	\$1.6288
3,000	0.9108	.....	0.9143	0.9739	1.0493	1.1660
4,000	0.8928	.....	0.8801	0.9193	0.9688	1.0419
5,000	0.8887	.....	0.8652	0.8937	0.9298	0.9871
6,000	.....	0.8680	0.8626	0.8813	0.9109	0.9571
7,000	.....	0.8698	0.8631	0.8751	0.9013	0.9425
8,000	.....	0.8656	0.8752	0.8975	0.9393	0.9437
10,000	.....	0.8766	0.8818	0.9021	0.9437	0.9437

speeds. The effect of freight-car costs at this speed overbalances all the others, and the total for all the items considered, as shown by Fig. 16, is consistently high. For speeds of 12, 16, 20 and 24 m.p.h. there is a definite tonnage at which the cost reaches the minimum value, the low point being nearer the maximum tonnage than for the corresponding speeds in Fig. 10. This likewise is accounted for by the reduction in freight-car costs at the higher speeds. Within the range of tonnage which can be hauled at the higher speeds little difference in cost is shown between 16, 20 and 24 m.p.h.

The relation between operating costs and ton-miles

per hour is shown in Fig. 17, which indicates that this unit is not a reliable indicator of economical operation. For a given speed the lowest cost is at a ton-mile per hour rate only slightly below the maximum. On the other hand, inspection of the curves shows that when the operating speed is 24 m.p.h. and the ton-miles per

portion of the whole than when freight-car costs were included. Comparison on the basis of gross ton-miles per train-hour, as plotted in Fig. 20, again shows that this unit is not a satisfactory index of economical operation.

Conclusion

These articles have been presented in an endeavor to outline a logical method whereby the cost of train operation under various conditions could be analyzed from a knowledge of the fundamental characteristics of the locomotive and operating data which are readily procurable. The special case for which calculations have been given should be regarded only as an illustration of the application of the method and not as setting forth the results that may be expected on any individual operating district. The numerous factors which determine the cost of operation are subject to such great variation that it does not seem possible to present data to suit all the different conditions. For the same reason few definite conclusions can be drawn from this study which will be generally applicable. It follows that the figures given should not be used without revision unless investigation shows that the assumptions made in the text hold true for the particular case being considered.

One point brought out in the analysis which seems to deserve special emphasis is the effect of the rate of firing on operating results and operating costs. As was pointed out in the beginning, tonnage alone does not determine operating speed. Tonnage, speed, and rate of firing are mutually interdependent. If only one of those factors is fixed, the other two may vary, but if any two are fixed, for a given locomotive and a given gradient, the third must have a definite value.

The tables and charts show that for the various conditions considered the minimum combined costs occur at approximately the same rate of fuel consumption, which varies with changes in speed. It would seem, therefore, that the logical method of promoting economy of operation would be to control the tonnage and rate of firing rather than to strive for the maximum ton-miles per train-hour.

The method of analyzing train operation as exemplified above may seem laborious. However, efforts to determine the most economical operating conditions by analyzing train performance with varying tonnage seldom give satisfactory data because of the numerous factors involved and the difficulty of segregating the effect of any one variable. The results obtained on one division are of little value elsewhere. The analysis of the principal variable items of operating expenses as set forth in these articles may require an investigation of the characteristics of motive power and examination of certain statistics, but as such data became available, further studies would be facilitated. This method makes possible the analysis of each important factor. It is believed that it is worthy of consideration because it is adapted for analyzing so many problems involved in railway operation.

Fig. 20—Total of Selected Items, Excluding Freight-Car Costs, at Constant Speeds

hour near the maximum, the cost is the same as it would be at 12 m.p.h. with an output in ton-miles per hour only half as great.

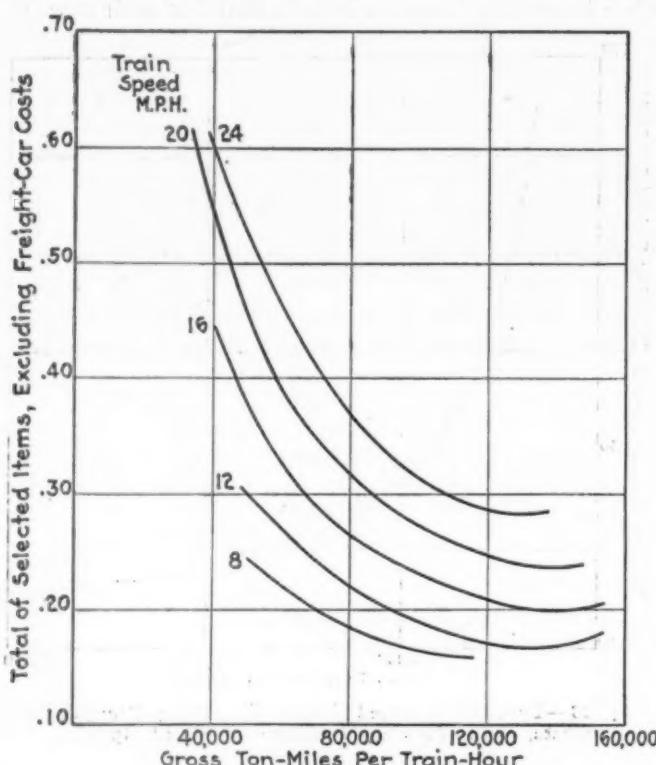
If a railroad is hauling traffic entirely in its own freight cars and has sufficient equipment to take care of all requirements, the freight-car costs shown in Table IX would not be affected by train speed. To illustrate the different relations between operating costs under that condition, the sum of the other items considered has been shown in Table XII and Figs. 18, 19 and 20.

Table XII—Total of Selected Items of Operating Expenses, Excluding Freight-Car Costs

Coal per hour, pounds	Operating speed, m.p.h.					
	8	10	12	16	20	24
2,000	\$0.2369	\$.....	\$0.3047	\$0.4420	\$0.6182	\$0.9698
3,000	0.1798	.....	0.2193	0.2979	0.3853	0.5070
4,000	0.1618	.....	0.1851	0.2433	0.3048	0.3829
5,000	0.1577	.....	0.1702	0.2177	0.2658	0.3381
6,000	.....	0.1600	0.1676	0.2053	0.2469	0.2981
7,000	.....	0.1618	0.1681	0.1991	0.2373	0.2835
8,000	.....	.....	0.1706	0.1992	0.2335	0.2801
10,000	.....	.....	0.1816	0.2058	0.2381	0.2847

As the various items, with the exception of freight-car expenses and fuel and wages increase consistently with each increase in speed, it was to be expected that the minimum costs in Table XII would be found at the lowest speed. Fig. 18 shows that for speeds up to 12 m.p.h. the most economical rate of firing is 5,000 lb. an hour. From 12 m.p.h. to 16 m.p.h., 6,000 lb. an hour brings the total cost lower, and at higher speeds there is a slight saving at 7,000 or 8,000 lb. an hour. From Fig. 19 it is evident that for any given tonnage the variation in cost at different speeds is a smaller pro-

THE SCHEDULE SPEED of the Empire State Express of the New York Central between New York and Buffalo, 438.4 miles, in 8 hours, 45 minutes, is 50.1 miles an hour, said to be the fastest time prescribed for any regular train in the world for so great a distance. There is a considerable number of short sections of road over which speed has to be reduced, and the average time of this train while moving at full speed is about 60 miles an hour for the whole distance.



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The Yard at McKees Rocks Is the Largest on the Railway

Prove Success of

Pre-Classification

Pittsburgh & Lake Erie- New York Central plan results in economies in operation and expedited yard movements

AS a result of the inauguration of a plan of pre-classification on the Pittsburgh & Lake Erie, one of its subsidiary lines which originates a large volume of traffic, the New York Central has been able to close its yard at Coalburg, Ohio, entirely as a through freight terminal. In addition, improved operation has been obtained on the P. & L. E., particularly with reference to the movement of freight through the Youngstown district, which is the western terminus of the P. & L. E. The savings made in the time of movements through the Youngstown terminal, including interchange, found by a check of the movement of 1,000 cars eastbound and a similar number westbound, before and after the pre-classification plan was put into effect, averaged 14 hr. 24 min. per car westbound and 7 hr. 43 min. per car eastbound.

Plan of Operation

The P. & L. E. is, to a large extent, an originating carrier, serving a great number of the steel mills in the Pittsburgh district. For years, its plan of operation has been different than that of other roads. At first glance it would appear that the logical procedure would be to establish a large classification yard at the junction of the three lines at McKeesport, Pa., in the outer limits of the Pittsburgh district, and bring all cars into this yard for classification. However, the idea on this road has been to establish a number of smaller yards close to the principal points of origin of the traffic, where, as far as possible, all traffic is collected into trainload lots and

then sent through to destination or to junction points with connecting lines, without yarding at intermediate points.

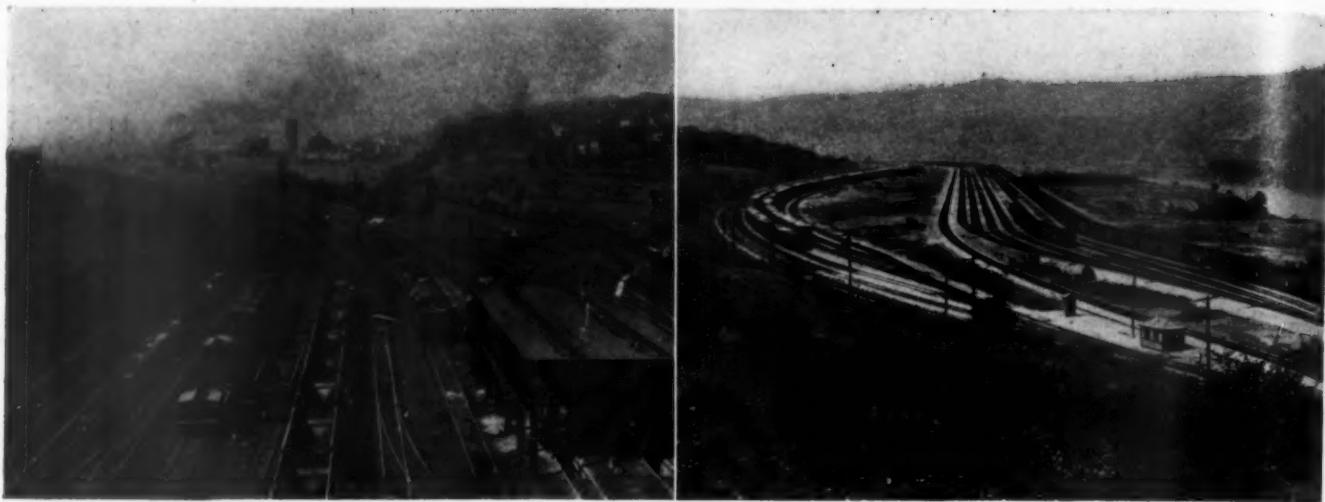
In addition to a number of smaller yards, yards are maintained by the Pittsburgh & Lake Erie at the following points in accordance with this plan:

Yard	Car Capacity
Dickerson Run	2,900
Newell	1,480
East Newell	1,490
Glassport	2,820
Jacobs Creek	895
Port Vue	1,138
McKees Rocks	4,120
Aliquippa	3,200
College	598
New Castle Junction	1,400
East Youngstown	7,000

The Dickerson Run yard is situated near the east end of the Youghiogheny division, near Connellsville, Pa., and in addition to handling the traffic originating in the Connellsville district, also serves as the interchange yard with eastern connections at that point.

Newell and East Newell yards are situated near the south end of the Monongahela division, where much coal originates. Glassport yard, just south of McKeesport, Pa., on the Monongahela division, was built to reduce light train mileage and is used for the collection and classification of coal and other traffic originating between Newell and Glassport. Similar reasons actuated the building of the yards at Jacobs Creek and Port Vue in the Youghiogheny division, which assemble the coal that originates in their vicinity.

McKees Rocks yard handles the business originating



The East and West Ends of the P. & L. E.: Right; Newell Yard: Left, East Youngstown Yard

in, and destined to, the immediate environs of Pittsburgh, and also acts as an interchange yard with two or three short coal carriers, which connect with the Pittsburgh & Lake Erie in that vicinity, while Aliquippa yard serves an intensive industrial district in the Ohio Valley just west of Pittsburgh.

The yard at New Castle Junction handles the business from and to the important branch at New Castle, Pa., while College Yard serves the Beaver Valley industrial district, where several large fabricating plants are situated.

East Youngstown Operations

The largest yard on the line is at East Youngstown, Ohio, where interchange is made with western connections, including the New York Central, the Lake Erie & Eastern and the Erie. In addition, it serves the productive Youngstown manufacturing district.

The efficient operation of this latter yard is particularly important to the success of the railway in general. It is a flat yard and each switching crew consists of a foreman, a cutter and three field men. As in all flat yards, correct classification is particularly important, to avoid the duplication of effort necessary in retrieving cars when they have been shunted onto the wrong tracks. A particularly high average of accuracy is maintained by the East Youngstown crews in this regard. This is caused in part by the skill produced by long experience. Another factor is the rather unusual procedure of making five copies of the switch list, one for each member of the crew, including the field men, instead of one copy each for the foreman and cutter only, as is the usual practice. The field men wear the switch lists fastened on their sleeves with rubber bands. This affords a quintuple check instead of the usual double check, and produces a high degree of accuracy.

The Pre-Classification Plan

The loaded traffic is predominately westbound, as may be seen from the figures contained in the accompanying table, which shows the percentage of loaded and empty cars handled in each direction for the past four years, including, for comparative purposes, four of the months of each year.

In addition to the preponderance of empties over loads eastbound, much of the freight moving in this direction on the P. & L. E. consists of ore and unfinished products, in other words, bulk freight, frequently moving in trainload lots, and not requiring elaborate classification at any time. Accordingly, the pre-classification plan

has been confined largely to the westbound movement.

When it was decided to pre-classify for the other N. Y. C. lines, a joint conference was held by the operating officers involved, where the results of individual preliminary studies were presented, and a plan was worked out.

	Comparative Loaded and Empty Traffic			
	% E. B. Loaded	% E. B. Empty	% W. B. Loaded	% W. B. Empty
Jan. 1928	27.8	72.2	90.5	9.5
Apr. 1928	29.1	70.9	89.1	10.9
July 1928	34.0	64.0	88.0	12.0
Oct. 1928	35.3	64.7	90.0	10.0
Average 1928, 10 Mos.	33.0	67.0	89.1	10.9
Jan. 1927	31.2	68.8	88.3	11.7
Apr. 1927	34.5	65.5	88.9	11.1
July 1927	38.9	61.1	87.4	12.6
Oct. 1927	30.0	70.0	89.9	10.1
Average 1927	33.4	66.6	89.2	10.8
Jan. 1926	30.2	69.8	91.8	8.2
Apr. 1926	34.1	65.9	89.5	10.5
July 1926	42.0	58.0	88.3	11.7
Oct. 1926	43.1	56.9	88.6	11.4
Average 1926	36.7	63.3	89.0	11.0
Jan. 1925	27.0	73.0	91.8	8.2
Apr. 1925	36.8	63.2	89.0	11.0
July 1925	40.4	59.6	88.4	11.6
Oct. 1925	36.2	63.8	92.7	7.3
Average 1925	35.6	64.4	90.3	9.7

These preliminary studies were so careful and thorough that, with the experience gained in actual operation, only a few changes in grouping have since been necessary. The destinations and connection points comprise 40 groups, divided into four general headings. Nineteen groups cover cars destined to points on or via the N. Y. C., via Youngstown, Ohio; 13 groups, N. Y. C., via Lansingville, Ohio; 4 groups, Erie, via Youngstown; 1 group, destinations on the Lake Erie & Eastern; while 4 groups cover cars destined to local points on the P. & L. E., or cars moving via direct connections other than the N. Y. C., the Erie or the L. E. & E.

All cars offered for movement to points beyond the four railways named above are grouped in accordance with the group number assigned to the junction point where delivery is made to the connecting line via the N. Y. C.

The Classification Book

In order that each employee concerned may be fully informed, a comprehensive classification book has been issued, showing the details of the plan. Each group is first listed and indexed separately, showing the stations and junction points in station order. This is followed by an indexed list in alphabetical order, showing all stations and junctions on the P. & L. E. and the N. Y.

C., giving the number of the group to which each station belongs. The book also contains a chart showing the entire New York Central, with the station locations and the groups illustrated, giving where necessary, the special instructions applying to each group.

The plan applies to all westbound loaded cars and all empties traveling under home routing or under revenue waybills. In general, a sufficient tonnage is available to make up the trains properly at each yard. In the event that a sufficient number of cars is not available for a tonnage train at a given time, the yardmasters are required to call upon the superintendents for instructions as to the forming of combinations of groups of cars so as to permit the movement of a full tonnage train. In any event, cars of the same group number must be together in the train.

In addition to yard officers, local agents are also provided with copies of the classification book and, in making up waybills, indicate thereon the group number and the symbol train in which the traffic is to move. This requires little effort on the part of the agency forces, and materially simplifies the yard supervisor's duties in connection with the plan.

The success of this plan indicates the benefits of pre-classification most clearly. The efforts of the P. & L. E. along these lines have materially relieved the yards of the parent company. It has been proved further that pre-classification can be performed successfully, even as between separate operating units, and when the large preponderance of traffic is in one direction. This plan also supplies an excellent commentary of the future possibilities of pre-classification not only between separate units of the same system but as between different systems.

Pennsylvania's Investment in Advertising

GENERAL W. W. Atterbury, president of the Pennsylvania, was the guest on Monday evening, April 15, of the Advertising-Selling League, at Omaha, Nebr. He made an interesting address on the present passenger and freight traffic situation, on the Pennsylvania and in the country generally; touching particularly on the developments of recent years which have greatly modified competition, and telling of the plans of the Pennsylvania for co-operation with the Trans-Continental Air Transport for carrying passengers between New York and the Pacific Coast in about 48 hours.

Speaking of the means which a railroad must adopt to "keep ahead of the procession"—to provide the public with good service and to insure that the public knows that good service is available—General Atterbury said:

"Good service is now the normal routine, day to day experience of the public with the railroads. But adequate service today will be altogether inadequate in the future unless we prepare well in advance. More than five billion dollars has been spent since 1920 in getting the railroads to their present state of efficiency and economy of operation. The future calls for projects of still greater magnitude. Steam power is of course, basic to transportation in this country but special conditions make electrical operations desirable in some instances. That is why we have just undertaken to spend \$100,000,000 in electrifying our lines between New York and Washington. We are about to enter upon one of

the most extensive signal installations in railroad history. Our bridge building program this year is designed not alone for today but for heavier power we shall be using some years hence. We have just placed orders for a million dollars worth of new machinery to enable us to maintain the roadway more economically. Our research department is investigating still heavier rail-than-our standard 130 lb. rail, and so on.

"It is curious, but it is true that the fact that railroad service is so good now makes it all the more necessary to sell the public the idea of enabling us to make it stay good and reach even higher levels of performance. Investors whose savings are invited into railroad development must be assured that they will receive a fair return upon their money. It is a serious matter for me to recommend to our directors the issuance of, say, \$100,000,000 in new capital stock. When we get that money we become trustees for it and have a solemn duty to earn and pay a reasonable return on it. We take a real risk in estimating the volume of traffic that will be available with which to earn that return, and it is vital for us to feel sure that the public, through its legislative and regulatory authorities, will permit us to earn enough to pay a fair return to our stockholders.

"To refer again to advertising. We have for the last three years been publishing advertisements of the Pennsylvania Railroad in a group of national magazines and local newspapers. We have not been trying to sell tickets or ton-miles to people who may never have used the Pennsylvania. We are selling something more than that. We are selling transportation service, a fundamental and permanent human need. There are as many components to our service as there are employees on our payroll. To advertise for passengers and shippers to use our trains without trying at the same time to build up employee morale that will steadily improve our service would be missing a great opportunity.

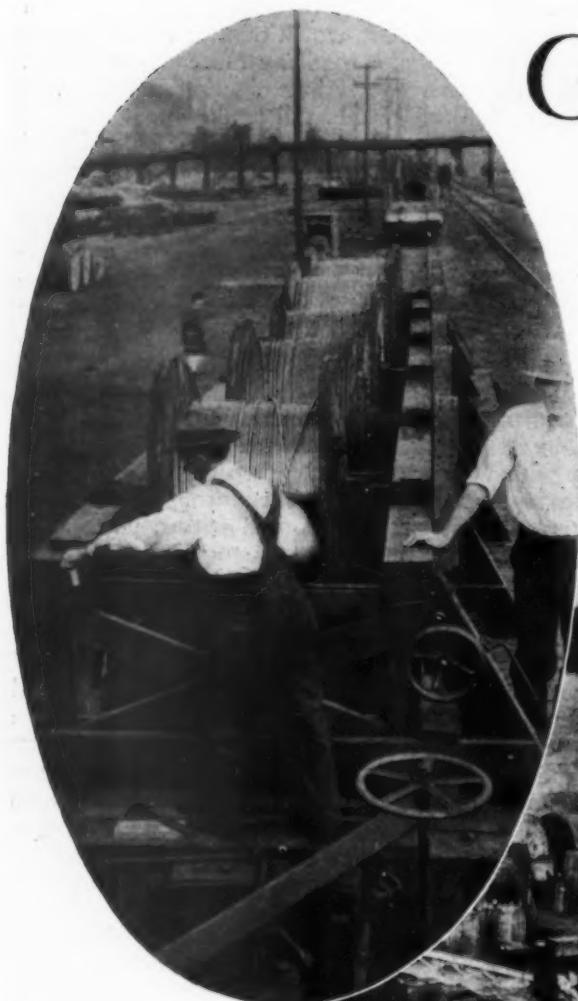
"That has been the fundamental purpose of our advertising,—to build up and maintain such a pride in Pennsylvania Railroad service on the part of employees that it cannot but result in performance which the public will be satisfied with and want to have whenever they travel or ship a carload of freight. Unusual vigilance, unusual courtesy, unusual imagination must be rewarded if we are to expect them in the future. Emulation must be stirred to raise the whole standard of service. We have found in advertising a powerful method of accomplishing this purpose. Our advertisements are stories of executives' imagination, engineers' genius, ticket sellers' courtesy, and track layers' skill, etc. By explaining and clarifying to the traveling public what already exists, we try to make the public demand what we ourselves want to deliver in larger measure.

"We purpose now to go further by substantially increasing our advertising expenditures. We want particularly the people west of the Mississippi river to know more about our railroad so that when they come East they will give us an opportunity to serve them. We are, therefore, going to increase our newspaper advertising all through the West and Southwest, and we are confident that the results from this advertising will justify our faith in it. There is no doubt in my mind that our advertising during the last three years has been an important factor in helping to bring about some of the improvement in service, in courtesy, in economy and in general all-round efficiency of our operations. We have looked upon our advertising appropriations as an investment and we are so well satisfied with its returns that I regard it as a continuing part of our public policy."

Supplying the

Great Northern's

*Special methods of han-
dling material and up-to-
date record system prove
economizers in completing
big project*



Trolley Wire Assembled—A "Reel" Loading and Unloading Dock

ONE of the major improvements undertaken by the Great Northern in connection with the building of the eight-mile tunnel through the Cascade mountains, which was opened on January 12, was the electrification of the line between Wenatchee and Skykomish, a distance of 71 miles. This part of the program was carried out by the company's own forces and it was completed on the date scheduled, the opening date of the tunnel.

The successful completion of a construction project like that undertaken in electrifying this section of the Great Northern under the conditions imposed, depends to no small extent on a never-failing supply of the materials that go into it and also upon a reliable system of records. The material for the electrification consisted of thousands of feet of guy and trolley wire, trolley poles, transformers, different kinds and sizes of pole line accessories, much sub-station equipment, etc. The source of some of this material was close at hand while much of it came from long distances, for instance, Chicago; Minneapolis, Minn.; Pittsburgh, Pa., and

Philadelphia; Schenectady, N. Y.; Paterson, N. J.; Baltimore, Md.; Bethlehem, Penna.; New York, etc., and, at times there were as many as nine crews using this material at different points on the line.

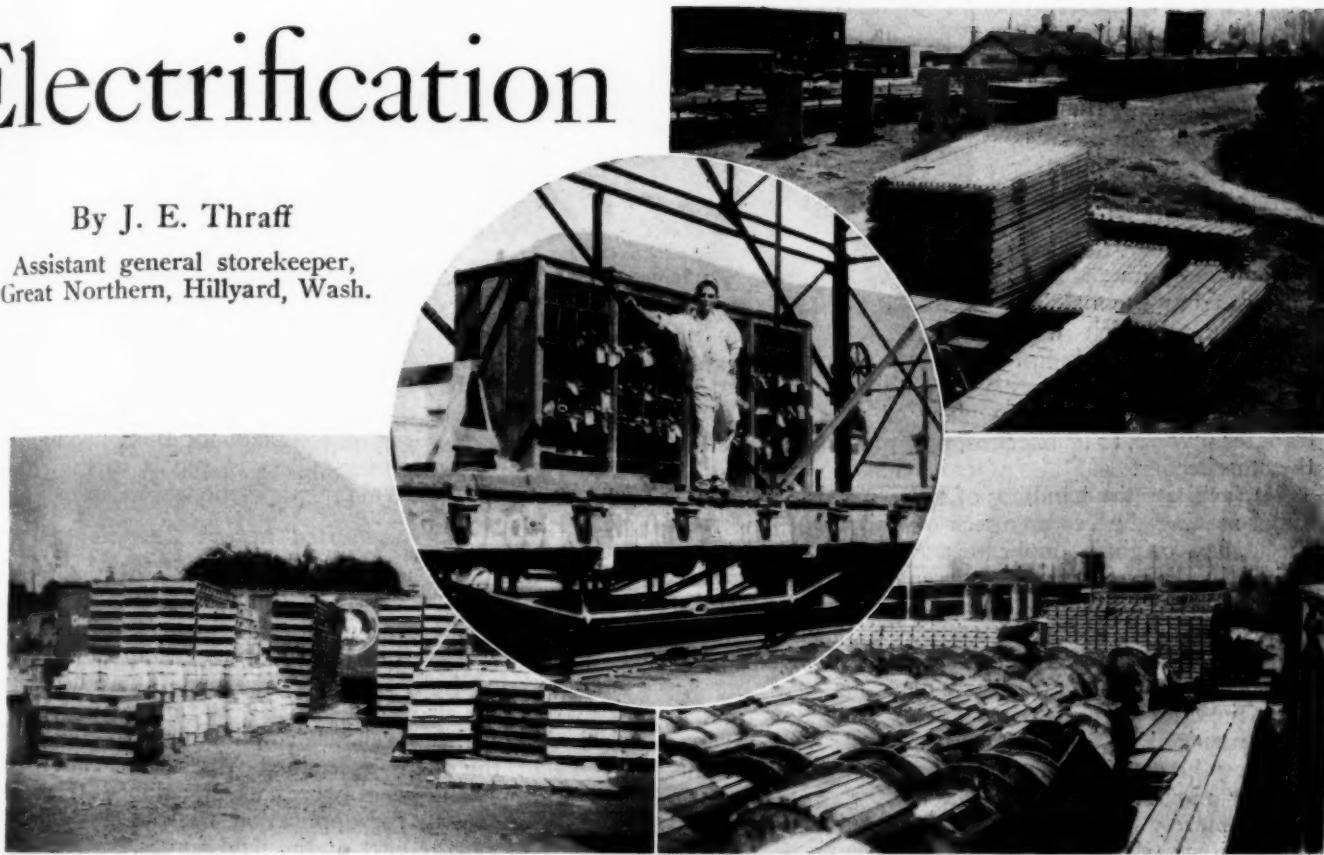
Special Organization Formed

The supply organization was composed of a storekeeper, selected from the stores department, an assistant storekeeper, one clerk, and material handlers as required from time to time. A crane operator was later added to the organization. In order to facilitate matters and avoid needless duplication, this organization, although under the general jurisdiction of the general storekeeper, reported direct to the engineer in charge of electrification. For the receiving, checking, storing and distribution of the material, a temporary warehouse was erected at Leavenworth, Wash., which was centrally located and best adapted to the work, and all the smaller, as well as the major portion of the larger items, were concentrated at this point. The only items that were not stored there were poles and the bulkier substation

n's Electrification

By J. E. Thraff

Assistant general storekeeper,
Great Northern, Hillyard, Wash.



In the Material Yard at Leavenworth, Wash.—Center, Material Rack on Work Train with all Trolley Supplies Sorted and Tagged

apparatus, which were shipped direct to the point of installation.

Check Incoming Material

All material received for the work, whether received at the warehouse or at some point on the line, was checked by the storekeeper or his assistant, and as this organization had no part in the handling of any invoices covering the shipments, a blind check was made in each case. Incoming shipments were listed on special forms known as acceptance sheets. These forms were made in quadruplicate, and numbered consecutively. The originals were sent to the accountant in charge, one copy each to the engineer in charge and to the construction superintendent, and one was retained in the storekeeper's file. Since these acceptance sheets formed the basis for several transactions, such as the passing of invoices, freight and express bills, etc., every effort was made to show complete and correct information. In addition to the usual information, such as the date received, requisition numbers, car numbers, quantities and full description of materials, the forms were also marked with the way-bill numbers, number of packages, boxes or crates in each shipment and the weights; in fact, with all information that seemed likely to be of value in checking back at any time, including references to shortages and damage.

Card System for Stock Records

As practically only special material, or material peculiar to this particular work, was handled at this ware-

house, the Great Northern store department form of stock book was not used. It was decided to use a card system instead. A special form of card was provided, which, in addition to the full description of the item, included also the necessary receiving record, such as date received, the acceptance sheet number, name of shipper and quantity received. No reference was made to the requisition number covering the shipment, as this information was in each case shown on the acceptance sheets which were filed according to their date and numerical order for ready reference. The stock cards were posted daily from the acceptance sheets. The cards also served as a detailed record of material shipped to the foremen, space being provided for the dates and quantity of each shipment.

At the close of each month the stock cards were brought up to date and the space for entering quantities on hand was filled in. The figures showing the amount on hand were verified by actual count of material on hand, however, whenever considered necessary.

Work Trains Kept Busy

The greater portion of the material was delivered to the crews by special work trains, supplemented by local freight shipments. Emergency shipments were made by passenger trains, and short-distance hauling was done extensively by auto trucks. For the purpose of ordering material, each foreman was supplied with special requisition forms, and in no case was anything shipped or delivered without a properly approved requisition. These requisitions were furnished in triplicate, were numbered

consecutively and filed separately for each foreman. Originals and duplicates were mailed or delivered to the warehouse, while the triplicates were retained by the maker of the requisition for his record, and for use in compiling the monthly material reports. Upon completion of the shipment or delivery, the stock cards were immediately posted from the original requisitions, which were filed for use in checking the foremen's monthly reports. The duplicates were returned with the shipment, or mailed to the consignee in place of a packing list or transfer invoice, to be checked, received and returned to the storekeeper.

To facilitate the handling of these requisitions and to avoid making duplicate entries of shipments, the three sheets, i.e., original, duplicate and triplicate, were furnished in different colors. In case of material being ordered by telephone or telegraph a confirming requisition was in every case forwarded by the next train mail, or delivered in some other manner, assuring always a complete record of the transaction.

At the close of each month, all construction foremen were required to furnish the storekeeper with a report showing the quantity of material received and used during the month. The preparation of these reports involved merely the consolidation, under proper headings, of the items shown on the triplicate copy of their requisitions as received during the month. Foremen were also required to report the amount of material left on hand at the close of the month. This was readily available as the equipment furnished each crew included tool or material cars, fitted with racks for storing a small working stock of every item used. The forms for these reports were made in two sets, one set of nine sheets numbered from 1 to 9 inclusive, for reporting transmission and distribution system materials, and another of four sheets, numbered 10 to 13, for reporting substation apparatus.

These reports, after having been checked against shipping records as well as the previous month's reports, were then consolidated into one report, which was forwarded to the engineering division for further handling, and for use in compiling data for accounting purposes. To further facilitate the compilation of accounting data, one consolidated report was furnished for each valuation section. The forms were ruled to show the total stock on hand at the beginning of the month, total quantity received, the monthly disbursements to the four major classes of work and the balance on hand for each item of material, and



The Pole Line Equipment Was All Assembled by the Supply Unit

the description of each item with the catalog number and size was printed so that the reporting consisted simply of making the entries after the proper items enumerated.

Other records maintained by the supply organization included those pertaining to returnable containers, such as barrels, cement sacks, wire reels, etc., and also of the sales-orders covering their re-

turn. A car record was also kept, and this, in many instances, furnished the information required in determining rental periods on various equipment. In order that the car records might be complete for this purpose, the various foremen were required to report to the storekeeper the date on which equipment was released.

Material Assembled before Shipm

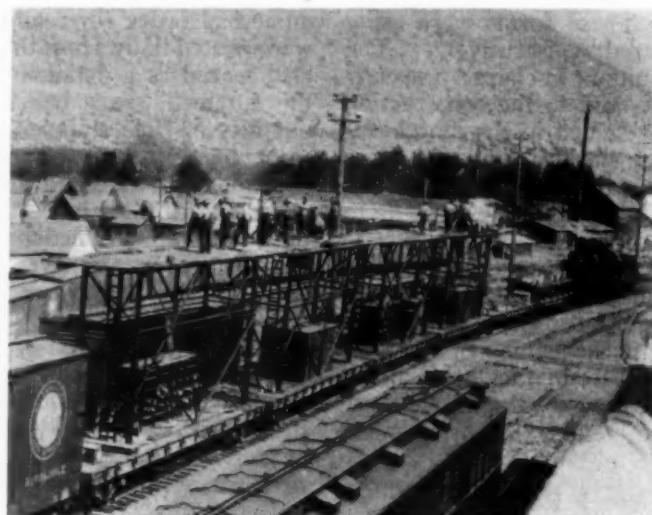
An outstanding feature of the work of the supply organization was that of assembling various parts into complete units before shipping, whenever possible. This naturally resulted in a big saving of time for the field forces, upon whom the work of assembling would otherwise fall. It also furnished the means by which any slack time at the warehouse could be used to advantage.

One of the items assembled was cross arms. The several thousand used were, when shipped from the warehouse, ready for application without any further assembling on the part of the field forces. The insulators were not put on, but the several other parts, such as grounding straps, saddles, through bolts, insulator pins and cross arm braces were all in place.

Another item was trolley hangers both tangent and curve types. The tangent hangers varied from 6 in. to 76 in. in length in fractions of half inches. The curve hangers, or rods, in addition to like variations in length, were furnished in four different degrees of angles. A small linen tag showing the length, and for the curve hangers, also the angle, was attached to each hanger assembled, after which they were sorted into bundles, each containing the quantity required for one span. Each

bundle was then tagged to show the number of the span on which the hangers were to be used, thus giving the field forces the correct hanger for each location on every span of the trolley installation throughout the entire project, without any measuring, sorting or assembling on their part.

This highly efficient method of handling hangers was brought about by the use of data compiled for other purposes. The several sets of data sheets that were compiled by the engineering division included one set which gave the location of each hanger, as well as the length



The Supply Unit Kept Up a Steady Flow of Material to Work Crews

and style required in each span and section. From this was obtained the information necessary to the correct assembling and distribution of hangers for the entire trolley system. Other sets gave quantities and kinds of the various other items used in the work, and by following these sheets and diagrams, which were compiled primarily for the use of the field forces, it was possible to assemble beforehand enough material to keep the several crews supplied.

Similar to other items of material used in this construction, the wire and cable were ordered from plans perfected in advance, and they were shipped from the factories in specified lengths, each reel being given a number to indicate the particular section of the line construction the wire was ordered for. These numbers were a part of the specifications shown on purchase requisitions and were taken from a specially prepared diagram showing the location, by numbers, of wire and cable reels for the entire trolley system. By following this diagram, the delivery of correct wire and cable for each location, or section, was simply the work of selecting the reels bearing the proper number.

The wire and cable were shipped to the crews on specially constructed cars. By having information relative to the progress of the work available at all times,

the requirements were anticipated and the cars were loaded far enough in advance to insure against delays. The weight of the full reels, ranging from 2,000 to 6,000 lb., and the fact that they had to be placed on arbors on the cars necessitated some mechanical means of handling. Since there was only occasional need for such mechanical equipment, the use of a steam derrick was not justified, so a chain hoist, mounted on a monorail set up over the loading track and extending over a portion of the platform, was provided. With this arrangement, it was possible to handle the wire reels with both safety and economy.

The cost of the several operations performed by the stores organization incident to the recording and handling of this entire lot of this material, was surprisingly low. The overhead charges covering all operations were less than one per cent of the total value of materials handled. It may also be of interest to state that under this organization of men experienced with all details of the daily supply problem, the job of moving a large variety of materials which had been stored at Skykomish to protect electrification operation through the old Cascade tunnel, were transferred to the new store at Wenatchee in remarkably short time and without loss or confusion of material or interruption to service.

Safety Section Meeting Draws Record Attendance

Aishton calls upon railroads to redouble efforts to reduce 1923 accidents 50 per cent by 1930

FURTHER improvement in the safety records of railroads of the United States and Canada must come from the placing of direct responsibility for accident prevention upon supervisory officers, in the opinion of safety and other railroad officers who spoke at the annual meeting of the Safety Section, American Railway Association, at the Claypool hotel, Indianapolis, Ind., on April 23, 24 and 25. Several voiced the thought that the day of "evangelism" in safety work, the need of convincing the average railroad man that safe operation is a part of the business of railroading, is past and that in the future attention must be directed largely toward personal work by supervisory officers among employes in their gangs and crews.

The keen interest displayed at the sessions was evidenced by the fact that the registration on the closing day was slightly more than 700, and the attendance at the majority of the sessions was approximately 400. The largest delegation present was from the Cleveland, Cincinnati, Chicago & St. Louis, with about 250 registered; large groups also represented the Pennsylvania and units of the New York Central Lines.

At the final business session, L. G. Bentley, general safety agent, Chesapeake & Ohio, Richmond, Va., was elected chairman for the ensuing year. Other officers elected were H. A. Rowe, claims attorney, Delaware, Lackawanna & Western, New York, first vice-chairman; C. T. Bailey, chief safety agent, Oregon Short Line, Salt Lake City, Utah, second vice-chairman; W. W. Wood, superintendent safety and welfare departments, Baltimore & Ohio, Baltimore, Md., F. M. Metcalfe, super-

intendent of safety, Northern Pacific, St. Paul, Minn., Frank Wenter, Jr., general claim agent, Chicago & North Western, Chicago, and W. A. Booth, director safety and first aid, Canadian National, Montreal, Que., new members of the committee of direction.

Address of Chairman

D. G. Phillips, superintendent of safety of the Wabash and chairman of the section for the past year, in an opening address, pointed to the commendable progress in the reduction of accidents, mentioning that 697 fewer employees were killed in 1928 than in 1923 or a decrease of about 35 per cent while injuries in the former year were 82,268 fewer than in 1923. He declared the most important progress was in the fact that better safety methods are now being used so that a minimum number of employees are killed and injured. A sentiment has been developed, not against being killed, but against doing the things which result in death. Safety officers have finally discovered the importance of the "come on" instead of the "go on" method of teaching safety and now realize that a yard, shop or division is only as safe as its supervising head wants it to be, he said.

Mr. Bentley, in presenting the report of the Committee on Education, stressed the need for the preparation of more complete accident statistics. He also recommended the production of an adequate safety film by the American Railway Association. Thomas H. Carrow (Penn.) chairman of the Committee on Statistics, summarized the Interstate Commerce Commission

records of accidents for 1928 and 1927 and advised concentration of effort on a reduction in fatal injuries as opposed to non-fatal injuries. To show that room still remains for further reduction in accidents, Mr. Carrow quoted a paper recently presented before the American Philosophical Society at Philadelphia by Dr. Ales Hrdlicka, curator of the division of physical anthropology of the Smithsonian Institution, in which it was stated that man is still as plastic in body and mind as he ever was and his capacity for greater mental efficiency and potentiality and refinement of the brain and sensory nervous system does not appear to be diminished.

J. C. Caviston, secretary of the Section, in his report quoted accident statistics to show the vast improvement that has been made in the number of injuries and fatalities on the railroads since 1917. He also gave a brief history of the American Railway Association, with its beginnings in the Timetable convention of 1872, and outlined its form of organization.

An Outstanding Shop Accident Record

One of the outstanding papers of the meeting was presented by W. R. Lye, district superintendent of motive power, New York Central, Collinwood, Ohio, on the subject "Mechanical Accidents, Causes and Remedies." He said in part:

"We have arrived at last at the root of the safety problem—the man who is in direct personal contact with a district's organization, who knows its most intimate characteristics and its necessities day by day. The cause of accidents, aside from the unsafe conditions and practices which have been gradually eliminated, resolves itself down to the mental attitude of the workman and the supervisor.

"In the Collinwood locomotive shop of the New York Central from 600 to 900 men have been employed during the last few years. In 1923 one employee was killed and 290 cases were reported to the Commission; in 1924, 119 cases were reported; in 1925, 109 cases; in 1926, 129 cases; in 1927, 87 cases; in 1928, 23 cases, and in 1929 there has been nothing to report to date. From June, 1927, to June, 1928, there were 640 personal injuries, 126 of which were reported to the Commission, resulting in the loss of 10,088 man-hours. From June, 1928, to the present time there have been 216 personal injuries, only two of which were I. C. C. cases, resulting in a loss only of 732 man-hours, and in December, 1928, for the first time in the history of the shop, not one minute's time was lost by any workman because of personal injuries.

"Previous to June 1, 1928, I considered that I had been doing everything a supervisor could do in the way of properly instilling enthusiasm into the organization. We had cleaned up our shops and roundhouses, we had removed thousands of dollars worth of material to the store house, we had provided expensive benches for the piling of material for locomotives and properly designed scaffolds for boilermakers and others, we had altered shop floor plans to acquire more floor space, we had carefully marked boundary lines for material, and we had placarded the shops with safety slogans. I had delivered talks to the workmen, sub-committees had been organized and I had talked with every man who had been injured during the year.

"On June 1, after all these things had been done, and appreciating the necessity for better records, I called every supervisor on my district to a meeting and in effect told them that if they thought that the district could operate economically and efficiently by allowing the present number of injuries to occur they had not the

least conception of what constitutes a properly organized institution. If accidents continue, I said, the blame is going to be placed where it belongs and that is, with the supervisor in charge of the men injured. A supervisor's efficiency is going to be weighed by that measure and any one who does not care to assume that responsibility will be placed in a position not requiring that ability.

"Accidents practically stopped from that day. The supervisors evidenced a spirit that they had never displayed before. They interested the Federated Shop Crafts so that they concurred in the spirit of safety and expressed a desire to co-operate with the management in order to create an increased individual interest and effort on the part of their membership for the decrease of accidents. Labor leaders and company officers appeared on the same platform and talked of the safety movement, checking systems were inaugurated, noon-day meetings were held and as a result the workman became intensely jealous of his own safety record and that of his gang. The participation of the shop crafts represented a new step in better team work and a wider and more effective interest in safe shop operation.

"It is remarkable that since that period there has been no demonstration in the way of meetings, and no supervisor has been brought before me on account of not fully appreciating his responsibility. My analysis is that results can never be properly obtained until it is brought home to the supervision of any district that he is equally responsible with the district supervisor for safe operation."

Accident Prevention in Wrecking Operations

Bernard L. Harmer, wrecker foreman on the Illinois Central at Springfield, Ill., presented the first paper that has ever been included in a Safety Section program on "Safety in Clearing Wrecks." He outlined in detail each step in the clearing of a wreck, as a result of 20 years without a personal injury at a wreck, from the time the wrecker leaves its terminal until it returns, pointing out the responsibility of and methods to be employed by the foreman in the prevention of accidents. Greater efficiency and safety are obtained if orders of division officers who are customarily present at wrecks are given through the wrecker foreman rather than direct to the men, he said. He mentioned the importance of a well-trained derrick engineer.

The report of the Committee on the Prevention of Highway Crossing Accidents was presented by D. H. Beatty (Sou.), in the absence of H. A. Rowe, (D.L. & W.), chairman. The report showed that in 1928, as compared with the previous year, there was an increase of 160 accidents, 197 fatalities and 54 injuries, which represented respective increases of 3 per cent, 8 per cent and 1 per cent, along with an increased automobile registration of 7 per cent. In connection with this report a grade crossing safety film, 200 ft. in length, which was presented to the Safety Section by the American Legion for purchase by individual railroads, was shown. It is intended that it shall be used by motion picture theatres as a rider for the news film at the joint request of the railroad and the American Legion.

H. A. Parrish, trainmaster on the Wisconsin division of the Chicago & North Western at Chicago, in a paper on "Safety and Its Relation to Train and Train Service Accidents" discussed that general subject and explained a method used on the North Western in which field safety men send to the superintendent's headquarters cards on which they note improper or unsafe conditions and practices. On the Wisconsin division in January,

1929, train and train service accidents were reduced 10 per cent through the turning in by field men on that division of 375 cards.

C. W. Nelson, assistant superintendent on the Atchison, Topeka & Santa Fe at Kansas City, Mo., in a paper on "Accidents to Yard and Train Men," indicated how accidents have been reduced at Kansas City. Mr. Nelson, in part, said:

"In 1923, on the Kansas City division, we handled 1,445,085 cars, a daily average of 3,956. During that year 919,700 man-hours were worked, with 59 injuries and one fatality or one casualty for each 11,588 man-hours. In 1928, 1,793,897 cars were handled, an average of 4,912 cars through the terminal each day, with 1,012,160 man-hours worked and 23 injuries and one fatality, or one casualty for each 42,173 man-hours. This means that, in 1928, 10 per cent more man-hours were worked and 24 per cent more cars were handled than in 1923 and the casualty rate was reduced 60 per cent.

"More than ever before management and men are convinced that there is no foundation in fact for the bugaboo that safe and sane operation means a slowing up of the work. Many supervisors now a dead-weight to their own organizations must develop some individual tractive power, must become way-showers and must be able to inspire men with their 'come on' rather than their 'go on'; only this type of leadership can cope successfully with the increased responsibilities of supervision as it exists today.

"In carrying on our safety educational work there have been no scattered or spasmodic outbursts; it is an every-hour-of-every-day-or-night matter with us; we have taken it too seriously to link it up with any band music, parades or ballyhoo. We are so vitally concerned about keeping our own house in order and so conscientiously determined to give safety performance that we find nothing to either envy or to interest us in the safety records of others."

Train Service Accidents Committee Report

In presenting the report of the Committee on Train Service Accidents, C. T. Bailey, (O. S. L.), chairman, stated that while train service accidents constitute approximately 30 per cent of the total accidents reported to the Commission, the proportion of fatal accidents in this particular classification is higher than any other occurring on the railroads of this country. About 64 per cent of all fatal injuries reported to the Commission from year to year are classified as "Train Service Accidents." The report listed the number and causes of accidents coming under the following descriptive heads: Coupling or uncoupling cars or locomotives, coupling or uncoupling air hose, steam hose and safety chains, operating locomotives, operating hand brakes, operating switches, employees coming in contact with fixed structures, getting on or off locomotives or cars, grade crossings and struck or run over at public crossings.

F. Hartenstein, assistant to the general manager, Lehigh Valley, chairman of the Committee on Train Accidents, presented the report of this committee, which showed that, as compared with 1927, in 1928 there was a decrease of 375 in fatal and non-fatal injuries as a result of collisions, an increase of 232 as a result of derailments, a decrease of 16 as a result of locomotive boiler accidents, a decrease of six as a result of other locomotive accidents and a decrease of 48 in miscellaneous train accidents. In analyzing 22 derailments covering a period of 12 months, it was found that they were variously due to the fracture of steel arch bars, broken rails, cocked switch as where brake shoes became wedged between switch points and stock rails, failure

of engineer to obey signal indication, track buckled under train, bridge weakened on account of high water, open switches, pulling out of coupler, operating train at excessive speed on a sharp curve, defective condition of truck center plate under a car, malicious tampering with track and engineer losing control on heavy descending grade. It was felt that many of the derailments could have been prevented by closer inspection of equipment and track.

Safford Stresses Need for Highway Traffic Law Enforcement

The program on Wednesday was largely devoted to a discussion of maintenance of way and freight station accidents and addresses by operating officers. The first speaker among the latter was H. R. Safford, executive vice-president of the Gulf Coast Lines and the International-Great Northern and vice-president of the Missouri Pacific, who asked that the 1930 meeting of the Safety Section be held in Texas.

Safety work, said Mr. Safford, is curbing wasteful expenditure. He referred to the goal of the safety movement as the training of the subconscious mind by continued example so that in the performance of duties the method is unconsciously correct. The most important point that must be impressed on city and state officers is the need for rigid enforcement of traffic laws, as evidenced by grade crossing accidents which are not due to conditions created by the railroads but by increased highway traffic, he said. Mr. Safford declared that the tendency of the railroads to become, more and more, insurers of the public must be checked.

J. W. Newell, vice-president, Wabash, who acted as the representative of J. E. Tausig, president of the same railway, at the meeting, stated that he was impressed by the fact that railroad safety activities reach not only the railroad employee but every man, woman and child in the country. Speaking from the standpoint of the railway officer, he believed that managerial officers expect their safety workers to call their attention to needed changes. He warned against allowing safety efforts to become commonplace and mentioned that safety posters at times appeared to be lacking in both ingenuity and novelty.

Worcester Guest at Safety Luncheon

H. A. Worcester, vice-president, Cleveland, Cincinnati, Chicago & St. Louis, was the speaker at a luncheon held on Wednesday noon. He characterized the safety movement as now being definitely in the stage where it is realized that improper practices must be catalogued with other inefficient ways of doing things. He offered the six fundamental requisites to safety success which the general managers of the New York Central Lines have placed before their supervisory officers and which are:

"1. You must believe in safety. 2. You must recognize your personal responsibility in accident prevention. 3. You must be active and not passive. 4. You must be a leader in impressing those under your jurisdiction of your sincerity in safety; letting it be known that the violation of safety rules and the performance of improper practices will not be tolerated. 5. You must have intimate knowledge of accidents in your territory, as to number, causes and the remedies applied. 6. With the knowledge that good safety records have been achieved in every department and in all classes of railroad service, you must believe in your ability to prevent accidents."

The first of the papers on maintenance of way ac-

cidents was given by H. A. Kuebler, office engineer, Kansas City Southern, on the subject of "Motor Car Accidents—Their Cause and Prevention." "Probably a larger percentage of motor car accidents are preventable than those of any other class, because back of almost every one is a violation of some safety rule or recognized safe practice," Mr. Kuebler said. "In 1927 more than 5 per cent of the reportable injuries on all railroads were in connection with the use of motor cars. They produced 21 per cent of the fatalities in that year and there were 22 deaths per thousand injuries as compared with 4.5 per cent per thousand of other injuries." He suggested that a plan similar to the examining and licensing of automobile drivers be followed with motor car operators and that the permit be made a matter of record.

Earl Stimson, chief engineer, Maintenance of way, Baltimore & Ohio, covered the entire field of maintenance of way accidents and their prevention in his paper. A summary of Mr. Stimson's contribution to the program follows:

The rate of casualties to maintenance of way employees in 1927 was exceeded only by that of the employees in train and engine service, the former working 23.8 per cent of the total man-hours worked by all classes of employees and suffering 28.3 per cent of the casualties. On the Baltimore & Ohio, which was shown to have a maintenance of way accident record in 1927 comparable to that of all roads in the eastern district, there were 0.67 men killed and 24.84 injured per million man hours. The three classifications having the greatest percentage of casualties—55.5 per cent—were "handling rails, ties and timbers" with 33 per cent, "operation of hand, motor or push cars" with 15 per cent and "strains and sprains by lifting and slipping" with 7.5 per cent.

Accidents in the first classification may be reduced by using machinery for handling materials, and potential injuries will be eliminated by the reduction in the number of men employed. Practically every motor car accident is the result of disobedience of the rules that have been issued to safeguard their operation and which, if followed, would make accidents impossible. Injuries of the third class, from strains and sprains, are of an intangible sort, at times are not above suspicion of being spurious and may be avoided or minimized by using correct methods in lifting.

The remaining 44.5 per cent of the total casualties were due to a great variety of causes, most of which apply to individual action and are preventable through the exercise of alertness and precaution on the part of the individual. Although the percentage to total casualties is small for the cause "struck by cars and engines", the number killed is high in proportion to the injured, as it is 17 killed to 8 injured. The rules governing men working on or about tracks point the way to safety and it is only by persistently keeping these warnings before the men that there is hope of avoiding the lapses that result so fatally.

A number of injuries are caused by the use of rail chisel and spike maul in breaking rail to length. The damage to the maul and the head of the chisel by spalling off, and the danger therefrom are greatly reduced by using a sledge hammer with its greater striking surface. By the use of a hack saw to cut into the edge of the base of the rail about one-half inch, the rail can be broken square, thus doing away with the use of the chisel for this purpose. Watching the men at work and correcting any faults observed in their manner of handling tools may save many from injury.

Aishton Calls for Further Improvement

Greetings of the other divisions of the American Railway Association were brought to the Safety Section by R. H. Aishton, president of the parent organization, in an address on Wednesday afternoon. In the last nine years the railroads of this country have expended annually more than 40 million dollars, directly designed to bring about increased safety in rail transportation, Mr. Aishton said, calling upon the railroads to effect a reduction in accidents by 1930 of 50 per cent over 1923, now that the original goal of 35 per cent has already been reached.

"The expenditure does not take into consideration millions of dollars which are being spent annually by the railroads for better equipment and improvements in other facilities, all of which tend to increase safety as well as bring about increased efficiency and economy in operation," he continued. "As a result of these expenditures together with the united efforts of officers and employes of the rail carriers, safety of travel by railway trains has increased more than 100 per cent in the last five years. In 1928, there was only one fatality as a result of a train accident among passengers out of every 49 million who boarded a railway train. Five years ago the average was one fatality for each 24 million passengers carried. Total fatalities in 1928 among passengers was 16 compared with 10 in 1927, 79 in 1926 and 83 in 1925.

"When you consider that the railroads, during the past year, carried about 800 million passengers, this safety record of the carriers of this country is remarkable. On the basis of reports on motor vehicle fatalities in 1928 from 37 states, it is estimated that 27,500 persons were killed in motor vehicle accidents during the year, an increase of 6.5 per cent above 1927. This means that one person was killed for each 900 registered automobiles. Five times as many fatalities occurred each day in automobile accidents in 1928 than there were passenger fatalities in train accidents during the entire year.

"When you consider that during the last five years, freight train speed between terminals has increased 18 per cent, freight car miles per day have increased 13 per cent, and gross ton miles per freight train hour have increased 41 per cent, the results obtained in promoting safety to those using the service, or employed in the operation of trains, are a growing indication that the efforts of the railways in directing expenditures to those things which will produce the greatest measure of safety, have been productive of commendable results."

Non-Train Accidents Committee Report

The report of the Committee on Non-Train Accidents, which was supplemented by individual papers on Wednesday, all of which were concerned with divisions of that general subject, was presented by G. H. Warfel, assistant to general manager, Union Pacific. It consisted of a detailed study of the sources of this type of accident, including 69 recommendations for safe practices which are intended as suggestions for the preparation of safety rules applicable to any railroad. The recommended practices were classified as to mechanical department, maintenance of way and structures, depot platform and freight house work, ore dock work, coal dock work and care and use of hand tools.

"The reduction of over 46 per cent in non-train accidents to employes on duty within the past three years is gratifying," the report stated. "But the very

fact that such marked reductions have been made so readily supports the belief that a large decrease from the 1928 figures is still easily possible by an intelligent and continuous campaign. Evidently the most difficulty is encountered in controlling accidents caused by handling heavy material, which is the largest specific item and the cause showing the least response to preventive effort except that of motor car accidents."

F. W. Curtis, superintendent of safety and fire prevention, Denver & Rio Grande Western, in a talk on "Employee Negligence" defined that term as "failure to perform duty." "In the year 1927 there were 18,976 train accidents, of which 5,897 or 31 per cent were charged to employee negligence. Collisions comprised 25 per cent and derailments 51 per cent of the whole number and employee negligence is assigned as the direct cause for 88 per cent of the collisions and 93 per cent of the property damage. It is also responsible for 12 per cent of the derailments."

Without detailed figures as to its extent of responsibility, Mr. Curtis ventured the opinion that about 75 per cent of the non-train casualties are attributable to employee negligence. He advised greater care in the selection of new men, mental and character tests for the more exacting lines of service, a more comprehensive systematic periodical re-examination of officers and men, greater consistency throughout signals and standards, greater attention to the simplification of printed rules and instructions and a more effective impartial system of sifting out undesirables as a means of decreasing the number of accidents that are due to negligence.

E. J. McDonald, freight agent of the Wabash freight station at St. Louis, Mo., where some 300 men are employed, reported that in 1926 there were no reportable injuries at that station, in 1927 there was one and since that time there have been none. Each clerk having men under his jurisdiction is made responsible for the acts of his men. Only trained employees are permitted to handle iron bridges or runways leading into and between cars as these are a fruitful source of injury. Truckers are required to push, and not pull, all trucks.

J. W. Howard, division car foreman on the Delaware & Hudson at Carbondale, Pa., told of his conversion to belief in the safety first movement, while a car repairer and of his conviction, after promotion to foreman of car repairs with jurisdiction over 125 men, that safe performance of duties offered the only means of increasing the efficiency of his men. Supervisors, he said, are taught to talk safety in their daily rounds and constantly make use of opportunities to correct unsafe practices or conditions, such as using defective jacks, hammers with cracked handles and chipped faces, cutting bars with burred heads and wrenches with spread jaws; removing center pins by hand; drilling, reaming holes, driving rivets and using the acetylene torch without protecting the eyes with goggles; removing trucks from cars without using safety horses; working about cars without properly flagging or locking the tracks, and allowing pieces of board with protruding nails to lie where they may be stepped upon.

Mr. Howard stated that on the division on which he is employed there were 62 reportable accidents per million man-hours among car department workers in 1918. In 1926 this had been reduced to 1.9 accidents per million man-hours. The present safety record on that division is 21 months without a reportable accident to 470 men.

"In January, 1925," Mr. Howard continued, "there were 31 minor accidents among about 500 employees, and from that time up to the present they have decreased constantly. For the year 1928 the highest number of

minor accidents in one month was 10. One of the causes to which our safety record has been attributed is the prevention of minor injuries. We have noticed that a run of minor accidents usually leads to a reportable accident."

Mr. Howard mentioned safety meetings, cards for the reporting of unsafe conditions or practices, the awarding of certificates for freedom from accidents and first aid classes as other devices used by his divisional organization to keep the need of safety before the employees. In the discussion following his talk he stated that discipline where violation of safety rules is concerned is used only in the form of instruction and that only after repeated warnings is any record made of a safety reprimand. He also looked upon the ability of an employee to "start the day right with a cheerful attitude" as of prime importance in the employees attitude toward his work and consequent prevention of accidents.

Other speakers at the sessions on Wednesday were W. H. Cameron, managing director of the National Safety Council, F. T. Singleton, chairman of the Indiana Public Service Commission, and a representative of Dan Sowers, national director of the American Legion. Mr. Cameron declared that the railroads can obtain more public praise and co-operation through a broad policy of participation in the public educational phases of the safety movement than from any other public endeavor.

The program on Thursday morning, the final day of the meeting, was mainly devoted to a round table discussion of the use of headlights on motor cars and the prevention of accidents in the handling of gang planks at freight stations. C. T. Bailey (O. S. L.) stated that his railroad proposed to furnish roadmasters and signal maintainers on certain portions of the road with permanent headlights for their motor cars. L. G. Bentley (C. & O.) declared that while all signal maintainers motor cars for night use on the Chesapeake & Ohio are equipped with headlights, the use of headlights on motor cars has not been encouraged because of the desire to discourage the use of motor cars at night and F. Hartenstein (L. V.) expressed much the same thought. F. R. Bradford (B. & M.) and C. A. Weir (U. P.) had found that some form of electric energy proved to be of the greatest value for headlights on motor cars. Other types of headlights were said to be unsatisfactory because of the lack of protection from wind on the open motor car.

C. W. Hammond (N. Y. C.), in the discussion of freight station safety, expressed the belief that only regularly-assigned men should be allowed to handle and brace gang planks between cars and between platforms and cars while J. B. Monihan (S. P.) declared that no regularly designated men should do this work, on the theory that each should be equally responsible for such accidents. E. R. Cott (H. V.), who stated that his railroad had not in recent years had a case of an injury through gang planks slipping, explained the use of a gang plank which is equipped with metal studs for use on wooden and brick platforms.

In response to questions, a number of those present mentioned the fact that on their respective roads it is the practice to allow employees other than trainmen to refuse to perform some duty in a manner which they consider unsafe, appealing to the foreman's immediate superior for a ruling in the matter. The employee may demur only long enough, in most cases, to obtain a ruling.

Mr. Bentley, in a short address upon his induction as chairman of the section recommended the holding of more frequent regional meetings of the section. In order to stimulate the safety movement on the Canadian railroads he urged that the annual meeting of the Safety Section be held in Canada within the near future.

Flashing-Light Signals Replace Manual Gates on L. & N.

Changes made at six crossings in East St. Louis result in saving of 131 per cent on investment

By L. R. Stahl
Assistant Signal Engineer,
Louisville & Nashville

MANUALLY-OPERATED crossing gates have been replaced by automatically controlled flashing-light crossing signals at six street crossings on the Louisville & Nashville main line in East St. Louis, Ill. The flagmen and gatemen were on duty only 18 hours a day, whereas the automatic signals afford continuous protection. The pay roll saving because of the gatemen relieved is about \$10,950 annually, which will pay for the new installations in less than a year.

Heavy Traffic Over Crossings

East St. Louis is a city of 74,000 population, and there is a very heavy automobile traffic over nearly all of these crossings. Two of the crossings are used for heavy bus and truck service. One crossing is on the road to Fairmount Park race course, on which there is extremely heavy traffic during the racing season. The traffic on the railroad consists of 8 passenger trains and 14 regular freight trains in addition to about 10 switch engine movements in both directions over each track daily.

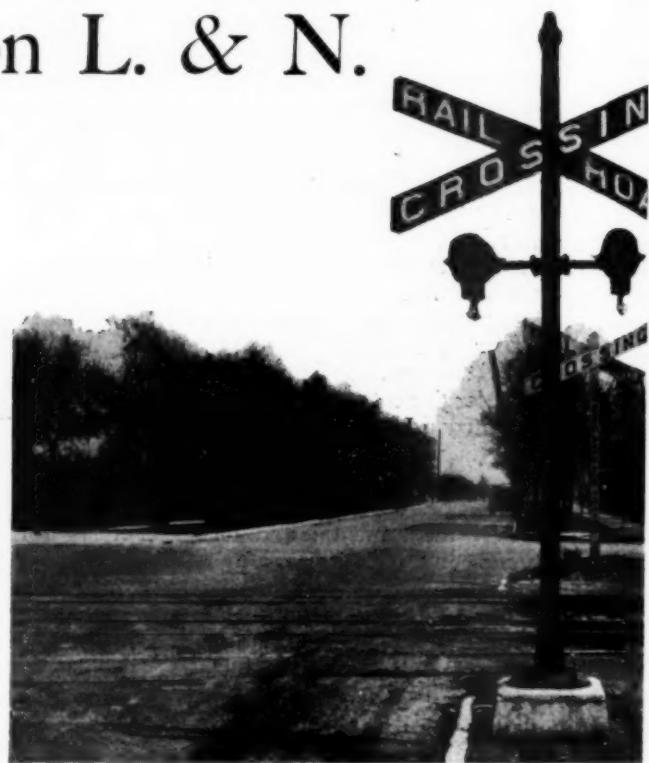
Economy of Replacing Gates with Automatic Signals

1—Cost of installing 6 layouts	.....	\$8,990.00
2—Cost of maintenance and operation:-		
	Per annum	
(a) Salaries of gatemen	.....	\$10,954.08
(b) Cost of maintaining gates	.....	450.00
(c) Cost of power for 6 layouts	.....	\$33.00
(d) Labor inspecting and renewing track battery	.....	\$40.00
(e) Total	.....	\$573.00
(f) Net saving (maintenance and operation)	.....	\$11,404.08
3—5 per cent interest on \$8,990.00 (Cost 1)	.....	\$449.50
4—5 per cent depreciation on \$3,896.00 (Net capital invested)	.....	194.80
5—Net saving after deducting interest and depreciation (f minus 3 and 4)	.....	10,186.78
6—Per cent net saving per annum (5) of Cost 1	.....	113.21 per cent

The railroad petitioned the Illinois Commerce Commission for permission to make the change in the crossing protection and approval was granted with the provision that the installation must be satisfactory to the city authorities. The city officers approved the first installation at Eighteenth street, and this led to the installation of the other projects. It is the intention to place flashing signals on the remaining crossings and this will result in a further saving.

Automatic Control Features

The circuits are arranged so that the minimum ringing circuit is 945 ft. for northbound movements at



Flashing-Light Crossing Signal Replaces Manually Operated Gates

Eighteenth street, varying for the other circuits to a maximum of 1,540 ft. for Seventh street. The speed of trains through this territory is restricted so that there is at least 20 sec. warning of the approach of a train at any of the crossings. Signal operation is designed so that a train moving in either direction on either track will operate the signal. Automatic track circuit protection is provided, with insulated joints and interlocking relays at each crossing. By means of circuits controlled through switch circuit controllers, switching movements are taken care of so as to avoid false operation of the signals.

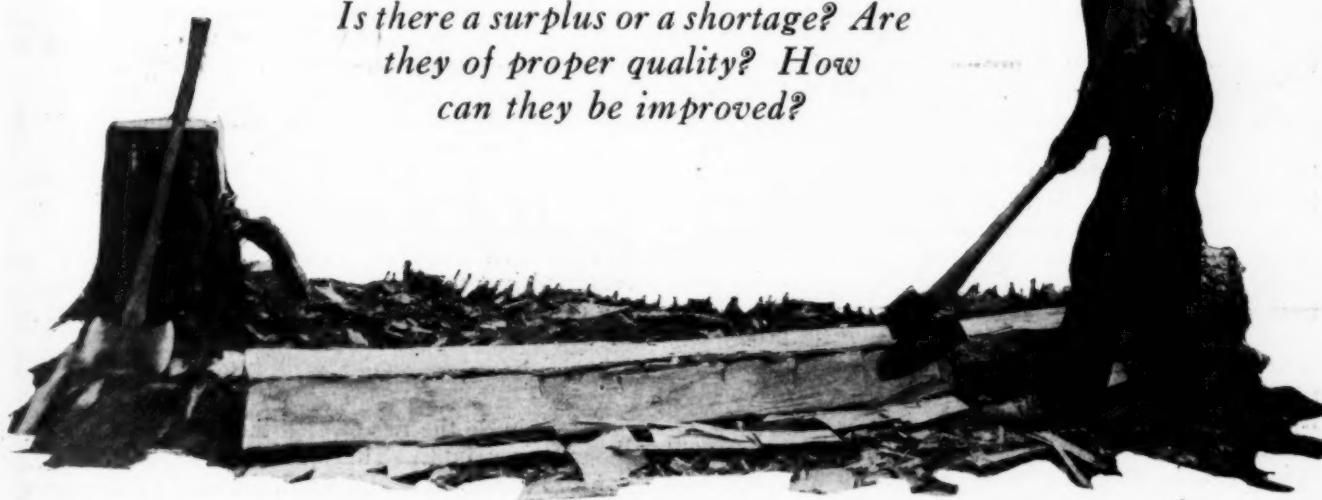
Use Storage Batteries for Emergency

At each flasher-light location, six cells of storage battery are installed for operating the flashing lights, the 670-ohm line relays and the magnetic flasher relay. The storage battery is charged through a rectifier at each location. Normally, the lights are operated on alternating current, but if this power fails a power-off relay switches the circuit to feed the lights from the storage battery. Power is furnished from the city power lines at 110-volts, 60-cycles. A 110-volt to 10-volt transformer is used at each location for operating the 10-volt lighting relay, and for the normal operation of the flashing lights. Parkway cable, instead of trunking, is used for all underground connections.

In order to prevent damage to the relays if an auto or a truck runs into the flashing signal, this apparatus is housed in cases located away from the road. Although there have been cases where automobiles have struck the signal, breaking off the mast, it has not been definitely determined as yet, whether there are enough of these collisions to warrant the expenditure of locating the apparatus apart from the two flashing-light poles.

How About Crossties?

Is there a surplus or a shortage? Are they of proper quality? How can they be improved?



THE adequacy of the tie supply and other questions of equal interest to the railways and to those who produce their crosstie requirements were considered at length at the eleventh annual convention of the National Association of Railroad Tie Producers at Hot Springs, Ark., on April 23-24. This meeting, which was one of the most largely attended in the history of this organization, was given over largely to the presentation of papers dealing with various phases of the railways' requirements for ties. The convention was presided over by J. J. Schlafly, Potosi Tie and Lumber Company, St. Louis, Mo., acting president of the association, assisted by Roy M. Edmonds, secretary-treasurer.

In a paper on Selective Logging and Tie Operations, R. D. Garber, Forester, Forest Products Laboratory, Madison, Wis., advocated the cutting of ties as a crop by selecting only the larger trees, allowing the smaller ones to grow to maturity. Elmer T. Howson, western editor, *Railway Age*, Chicago, spoke on Mergers and Their Affect on the Tie Industry, in which he suggested that as the railways are being consolidated into larger units, their tie requirements are likewise being consolidated and they will prefer to deal more largely with those companies which are in a position to deliver ties in large quantities, thereby making it increasingly difficult for the small tie producer to remain in business. "The merging of the railways will also," he said, "tend to raise the tie standards of the smaller roads to those of the larger properties with which they are merged, thereby curtailing the outlet for substandard ties."

The following officers were elected to serve for the ensuing year: President, F. M. Fonville, George W. Signor Tie Company, Ltd., Shreveport, La.; first vice-president, Roscoe Hobbs, Hobbs Tie & Timber Company, St. Louis, Mo.; second vice-president, F. C. Parrett, Baker Wood Preserving Company, Washington C. H., Ohio; secretary-treasurer, Roy M. Edmonds, St. Louis, Mo. (re-elected).

A feature of the programs of this association is the presentation of reports of conditions in the various tie-producing areas by the regional directors. F. C. Par-

rett (Baker Wood Preserving Company, Washington Court House, Ohio), reported that practically all of the treating plants in the North Eastern portion of the country carried over such large stocks of dry ties from 1927 that the demand was very light during 1928, with the result that prices were reduced to the point where production was curtailed. Demand has increased in this area in recent weeks to the point that there are now few ties at shipping points.

Reports on Production and Demand

C. D. Christian (Standard Tie & Lumber Company, Meridian, Miss.), reported that production and demand were both light in the South Eastern district last summer but that the demand increased during the fall to the point where there is now a shortage of ties in this district. W. J. Foye (Foye Lumber & Timber Company, Omaha, Neb.), reported a heavy production in the North Central district last winter which resulted in the accumulation of fairly large stocks which are now gradually being reduced by an increasing demand.

J. C. Fritschle (Hussey Lumber Producers Company, St. Louis, Mo.), reported that a long period of unsatisfactory prices had discouraged production in the South Central area to the point where the stocks of ties are now less than they have been for several years. Demand has increased recently in this area but it will take some time to bring production up to normal.

E. E. Pershall (President, T. J. Moss Tie Company, St. Louis, Mo.), chairman of the Committee on Statistical information, reported that the tie producing industry over the country was now in better shape than for some time, with stocks reduced to or below normal and with production more nearly comparable with demand.

Uniform Tie Purchases

The purchase of crossties at a relatively uniform rate throughout the year tends to improve their quality, promote adequate seasoning and simplify the problem of their distribution, according to R. S. Belcher, manager of treating plants, Atchison, Topeka & Santa Fe System, who addressed the convention on the sub-

ject: "Advantages of Uniform Tie Purchases."

"The uniform purchase of ties is made possible", he said, "by the management sanctioning the carrying of sufficient ties on hand at all times to cover estimated requirements for renewals, additions and betterments, and construction for one year. With a stock of ties on hand sufficient for the coming year, it is our practice to purchase the following year's requirements and arrange deliveries so that approximately equal quantities will reach the treating plants each month of the year.

"With a year's time in which to obtain the following year's ties, it is not necessary for a road to go into a temporarily rising market but it can wait until the price has again dropped back to normal, whereas, a road that is urgently needing ties, and buying them as needed, naturally has to pay the market price, even though it is temporarily above normal. The greater part of the Santa Fe ties are hewn ties and these, for the most part, are made by tie hackers who farm. There are some months in the year in which hewn tie production is low because the tie makers are too busy farming to make ties. By purchasing ties to be used a year hence, it is possible to await the time when the farmer-tie maker can again turn his attention to tie making, and it is not necessary to attempt to force production during the lean months.

"Purchasing ties at as uniform a rate as possible, throughout the year, enables a road to maintain a force of experienced inspectors rather than decreasing the inspection force and then increasing it again, perhaps by the addition of more or less inexperienced men, as may be necessary when "hand to mouth" purchasing is the practice. Inspectors are naturally more content when there is steady employment in sight, and are more efficient than men filling more or less temporary positions.

"Quality can be better maintained by both the producer and the purchaser under a uniform purchase program than under "hand to mouth" methods. We find that it is not very difficult, when accepting ties at a fairly uniform rate throughout the year, to correct any flaw that we may find in our inspection without harming the producers or causing an increase in price, whereas this would probably not be the case in times of forced production.

"When a stock of ties is maintained for current use, and receipts, in the most part, are considered applicable to work a year hence, purchases can be made and deliveries controlled so that the ties receive proper seasoning before treatment. On the other hand, if the ties are needed for insertion at the time they are purchased, or before sufficient time shall have been allowed for seasoning it is probable that some, at least, will not receive as much seasoning as they should, and a shorter life will be obtained from such ties by reason of the inferior treatment resulting.

"In the territory from which the Santa Fe obtains ties, production is heavier in some months than in others, and when production is heavy the acceptance of ties from the producers is not curtailed unless deliveries exceed the capacity of the treating plants to air-season thoroughly and treat properly. From a treating plant standpoint, the ideal situation is a uniform flow of ties into the plant each month. While we cannot quite hope for the ideal in this respect for the reason that it is good policy to obtain ties when production conditions are favorable, our purchasing department finds that it is possible to distribute the production of the yearly requirements in such a manner that there is a fairly even flow of ties to the plants, and we do not at any time ac-

cept ties beyond the capacity of the plants to treat, to such an extent that the ties are over-seasoned and deteriorate awaiting their turn through the plant.

"We have found at our Somerville, Texas treating plant," Mr. Belcher concluded, "that we can season the pine, oak and gum ties cut in the late fall and winter months longer without deterioration than ties cut in the spring and summer, and this is a point in favor of fall and winter production, but we also have found that we can thoroughly air-season the spring and summer cut ties, without deterioration, although they must be brought out of the woods soon after cutting and shipped in to the treating plant promptly. At our Albuquerque, N. M., and National City, Cal., plants, the untreated timber may be held any reasonable length of time before treatment without decay, but even the Douglas fir and western yellow pine take better treatment when seasoned just the right length of time. Correct seasoning can best be had when there is a fairly uniform flow of ties into the plant."

Producers' Failures

Wherein do the ties offered the railways fall short of the requirements? This question furnished the topic for an address by F. C. Krell, forester of the Pennsylvania System, Philadelphia, Pa., who described the shortcomings of the ties now being manufactured in part as follows:

In frequency of occurrence, the major causes for the rejection of ties are decay, dimensions, splits and shakes, knots, manufacture and holes.

Research and experiment have increased our understanding of decay in wood far beyond that possible 25 years ago. Excepting "pipe-rot" in cedar and "peck" in cypress, decay of any kind is objectionable in a crosstie. Preservative treatment will not, as some still vainly believe, make decayed wood good again. Ties are still placed on end on wet sites to conserve piling space but to an ultimate loss to their owners. Many ties with decayed wood on one or more faces would provide sound ties of acceptable sizes if the decayed portions were removed; yet the effort to make them acceptable is neglected and they are rejected.

The standard tolerances for dimensions are not intended to mean that the minimum is always to be desired, yet there are producers who seem to subscribe to that belief, for their ties are rarely of full size.

Splits caused by seasoning or badly felled trees will always be potential tie troubles. Shakes are at times more difficult to detect but timely attention would save producers' losses if insipient openings in the tie are protected and given less opportunity for destructive development. Anti-splitting devices are easily procurable and if more producers would give more than casual thought to this fact many ties would be saved from waste.

If many producers would appreciate that a crosstie in track serves as a beam and that the spikes must be afforded suitable space for driving into the tie, there would be less rejection for too large or undesirably located knots.

Successive experiences do not seem to teach some producers that the average consumer knows what he wants in a crosstie and the need to reduce or maintain a given operating ratio requires that he cannot depart in the least in the quality of the tie he must procure. When his procurement costs enter into the final cost of his ties and his inspector must select as well as inspect ties offered by the producers, those procurement costs soon become excessive.

There are producers who are aware of this fact. They study their markets and they learn the requirements of their customers and when an inspector arrives to inspect the kind of ties his road requires he is not offered the "run of the woods" and required to spend the major portion of his time sorting through the collection but his acceptances are not burdened with an initial high unit of procurement cost.

This leads to the suggestion that the producers can help themselves and their customers if they will recommend as general practice the separation of their ties by classes, groups and sizes in such a manner as will isolate those containing standard defects objectionable to the requirements of the consumer, thereby saving him unnecessary procure-

ment expense and themselves the losses for transporting and handling unacceptable material.

In meeting the demands made upon him, the producer has had to go farther afield for his timber. Utilization of his trees has brought the problem of the small tie, which in many sections probably in the crux of the situation with the majority of the producers. Intelligent consumers are fully appreciative of this problem of those who supply them with crossties and engineers have become increasingly tolerant and discriminating in the use of the different sizes of ties. Patience and education are needed to bring about a wider appreciation of the merits of the small tie but in the process the producers also can participate by a more judicious use of their timber. Should every tree in a tract be cut simply because a tie of some size is procurable? Would it not be better for the industry if you were to acquaint yourselves with your available markets and cut ties to meet your conditions? No small part of the existing woeful want in many formerly active tie territories can be attributed to the willful waste of the small and immature trees. Are there not, ordinarily, sufficient small ties in the logs from the upper portion of the tree without adding to the problem of disposition by cutting the small tree? True, where timber only is purchased, and the cutting time grows short, there can be argument for utilizing the small tree, but are habits so controlling that you cannot bargain for only those trees for whose products your markets afford outlets and enable you to dispose of the small sizes of ties which are incident to the production of the larger ones?

The Development of the Crosstie

The development of the crosstie during the last thirty years and the part the Tie committee of the American Railway Engineering Association has played in bringing it up to its present high standard were set forth by W. J. Burton, chairman of the Committee on Ties of the American Railway Engineering Association and assistant to the chief engineer of the Missouri Pacific, St. Louis, Mo., in a review of the work of this committee since the organization of the American Railway Engineering Association in 1899. Mr. Burton's address is abstracted below.

The early reports of this committee and the resulting discussions at the early conventions afford many interesting sidelights on the "state of the art" nearly a third of a century ago. The first report, presented at the 1900 convention, and evidently the work of the late Julius Kruttschmitt, chairman of the board of the Southern Pacific, emphasized the need for accurate tie life data, of which there was then little or none, and submitted proposed forms for voluntary reports from the railroads. These forms summed up the results on the per-mile-of-maintained-track basis not unlike the present statistics, but probably because the forms were quite elaborate, little or no data resulted from this first effort. Methods of dating ties so that their ages, when taken from the track, could be determined, were also discussed at this convention. Two or three roads were at that time using cast iron hammers in which the year was indicated by large numerals, with which the ties were dated and mention was made of a so-called "galvanized tack" with the date on its head.

The Committee Report in 1901

At this meeting Octave Chanute estimated that 2½ per cent of the renewals in the United States in 1900 would be made with treated ties and agreed with the prevalent idea that the railroads would soon face a tie famine. Metallic and substitute ties were also favorite subjects for report and discussion during the early years of the association, even though the 1901 report of the Tie committee had stated that "the cost as compared with wooden ties is so great that this does not appear at present to be a live question."

We find the statement in the second report that: "as regards inspection in purchasing, the inspector must be given no latitude as to the interpretation of the specifications, which should be so explicit as to leave no opening for a misunderstanding."

When one considers the variety of the specifications then in use, and the utter impossibility of determining some of their requirements, we see that the honest producer was in no position to accumulate stocks of ties prior to the receipt of specific orders. However, some producers then, as now,

did not always understand that there may be good justification for what may seem an undue tendency on the part of the engineer to split hairs in connection with his application of the specification.

The engineer has sometimes been considered unreasonable because he insisted that ties of less than full thickness must be degraded. Is such criticism justified when we know that a Size 3 tie only $\frac{1}{2}$ in. undersize, as regards thickness, is only about three-fourths as strong as one full size, and that a Size 3 tie similarly an inch thin is only a little over half as strong as a full-size tie?

The committee further reported in 1901 that:

"A uniform set of specifications for present use would be a benefit both to the railroad companies and to the tie makers. As it is now, where different railroads purchase ties in the same territory, it is customary for several inspectors to go over the same lot of ties, each picking out ties which come nearest to his specifications, which leads to a great variety of classes of ties and creates trouble for all concerned."

An important feature of this convention was an address by Dr. Hermann von Schrenk, in which the nature and means of spreading of decay were explained and the succeeding discussion indicated clearly that the ideas of infecting sound timber with spores from decaying timber, and that timber decay was the result of organic growths, were new to practically all present. Although now generally well understood, it is still much too commonly found that what were perfectly sound ties when made, have been subjected to infection and even serious decay through failure to pile them properly in dry locations entirely free from decaying wood. In this respect some producers and also some railroads are at fault. Too often the producer is satisfied if the decay caused by bad handling after manufacture has not progressed far enough to prevent the creosote from hiding the decay from the purchaser; and too often the railroad allows ties which were perfectly sound when delivered by the producer on the right of way to become infected and even badly decayed through the false idea that ties can be seasoned just as well in scattered piles along the right of way as in well-drained, clean tie yards where they can be watched, iron applied and treated as soon as sufficiently seasoned. It is also too common on some roads to see old ties and other timbers which have been removed, allowed to rot alongside the track, with every opportunity to infect the ties in the track.

The first tie specification prepared by the committee was presented at the 1904 convention. This specification was more like the present specification than some which came afterwards. For instance, there were seven standard sizes or classes, viz: 7 in. by 10 in., 7 in. by 9 in., 7 in. by 8 in., 8 in. by 9 in., 6 in. by 8 in., 6 in. by 7 in., and 6 in. by 6 in. The permissible woods were classified as between those which might be used untreated and those which, as the specification reads: "shall preferably not be used for tie timber without a preservative treatment."

This specification, while very much like the present specification, had one very important difference in understanding as regards its use. Each road was expected to pick out the one particular size which it desired to specify and there seems to have been no idea that the larger roads would accept several or all of the sizes. Most of them would probably have specified the large sizes, leaving the producer with the smaller sizes on his hands. Rather, perhaps, the committee did not appreciate the fact that the smaller sizes must come along with the larger, if reasonable or customary prices were to be maintained, and erroneously assumed that the producer could economically manufacture any size selected.

By vote of this 1904 convention, over the protest of the Tie committee, the requirement that ties must come from growing timber was inserted, disregarding, or not appreciating, the fact that dead timber may be perfectly sound; that timber in growing trees may be unsound; that failure to use sound dead timber would be wasteful; and that the tie producer would usually be unable to tell whether the sound tie came from a tree growing or dead at the time cut. Fortunately for all concerned, present day co-operation between users and producers of ties makes such mistakes impossible.

The 1904 specification appears to have been too far in advance for the industry at that time and there was practically no adoption of it. A few years later we find the Association balloting adversely on the question of a standard size of tie.

In 1909 a very elaborate report on substitute ties was presented and for several years thereafter this subject was given a great deal of attention. The economics of the substitute tie question were not appreciated then as now, nor were the benefits from proper handling and treatment of tie timber in

evidence as they are today. One interesting feature in this connection is that tie record forms, gotten out in 1909, provided for treated pine, hemlock, beech and spruce but not for oak, the idea of treating any kind of oak apparently not having been thought of. Treatment seems to have been considered more as a means by which inferior woods could be made usable for crossties than a means for reducing tie consumption and cost.

The World War, with the resulting Railroad Administration, presented the opportunity for a really standard tie specification which would not only be drawn up but which could be put into actual and extended trial and use. However, this specification was a radical departure from past practice, and probably partly because of the well-known inertia to any change, did not meet with the favor of many buyers and shippers. Moreover, this disfavor was heightened because the specification itself could not be judged on its own merits independently of certain objectionable purchasing practices of the Railroad Administration. However, the experience with this specification was watched closely by the Tie Committee so that, following the return of the roads to their owners, the committee was able to formulate what has since become the standard specification.

Ties Improve in Recent Years

The ties received in the last five or six years are much better than those obtained prior to the adoption of the standard. I do not mean to imply that all of the improvement is due to the specification. No doubt much of it has come about through the better understandings between producers and consumers. But whatever the cause or causes, the fact is that the great majority of the crossties fully meet the specification, and are not only carrying heavier loads and more of them than ever before, but are doing so with greater economy, as measured in cost per year of life rather than in first cost per tie. Furthermore, we hear little of a tie famine today. The greatly increased average life secured because of the greater care in production and use, and because of preservative treatment, together with the movements for reforestation and for the consideration and use of timber as a crop instead of an exhaustible resource, have made it practically certain that the tie industry need not look forward to the day when railroads must choose between steel or concrete ties.

The great majority of users specify ties today according to the standard specifications, but there are isolated buyers who still insist on non-standard ties. The continued stabilization of the tie industry would seem to depend upon the maintenance of established standards of quality and size. You gentlemen of the tie industry owe it to your business to resist, by all proper means, any demands or requests for substitution, or any efforts to mislead those responsible for railroad finances through the misbranding or overgrading of ties. Calling a Size 2 tie a Size 3 does not add one day's service to that tie or add one cent to its true value. It cannot give more than a temporary benefit, if any, to the individual demanding it and any such benefit in the long run is at the expense of the company.

The manufacturers of soft wood lumber are now marketing their products with the guaranteed grade stamped on each piece. It is my opinion that the adoption of such a practice by all the members of the National Association of Railroad Tie Producers, with each tie bearing the manufacturer's name and the guaranteed size and quality, would be the most beneficial step the industry could take. The few undesirable black sheep would soon find it impossible to continue in business without adopting the standards and practices of the association and the industry would be secure in its place among the sound, stabilized and modernly managed ones.

Undersize Ties Due to Carelessness

Of course the objection will be made that a market must be found for the undersize and unsound ties. While in my opinion much of the undersize results from carelessness in manufacture, the setting of the saws a bit too close in the belief that the inspector will not catch the deficiency, or the cutting of trees too small or unsound, and the unsoundness from improper handling after cutting, there is legitimately to be expected a certain small part of the product which is distinctly second quality. Such material should be labelled and sold as such and the finding of a market for it depends on the relative prices of the product as a whole. In this feature also the association is in a position to benefit the railways greatly by pointing out when it is true economy to use seconds or rejects, rather than permitting roads to go along with strictly specification ties, or by endeavoring to avoid selling the better ties when seconds will be equally satisfactory and less

costly for the particular service. Also, why should not the producer mark rejects or seconds as such before the railroad inspector gets to the pile and thus discontinue putting the whole burden on the inspector? Such action would be in line with modern business ethics. Better still, let the producer guarantee the size and grade and so mark the ties, leaving the railroad inspectors to check, the same as is done with practically all other materials purchased by a railroad.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading during the week ended April 20 amounted to 1,004,156 cars, an increase of 58,867 cars as compared with loading in the corresponding week of last year and an increase of 53,611 cars as compared with the 1927 total. The increase as compared with 1928 was largely due to the earlier opening of the ore traffic. Loading of all commodities, grain excepted, was larger than a year ago and livestock was the only class which showed a decrease as compared with the corresponding week in 1927. Loading in all districts was higher than in the corresponding week of last year. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading			
	Week Ended Saturday, April 20, 1929	1928	1927
Districts			
Eastern	233,834	220,717	221,614
Allegheny	206,867	199,014	198,257
Pocahontas	55,940	53,079	59,234
Southern	154,245	150,769	154,022
Northwestern	133,116	113,076	128,809
Central Western	138,748	131,563	124,244
Southwestern	81,406	77,071	64,365
Total Western Districts	353,270	321,710	317,418
Total All Roads	1,004,156	945,289	950,545
Commodities			
Grain and Grain Products	36,710	39,595	35,539
Live Stock	27,997	27,571	28,803
Coal	152,938	149,020	150,117
Coke	11,723	10,247	11,149
Forest Products	68,634	65,361	66,079
Ore	30,307	9,186	28,375
Mdse. L. C. L.	263,533	259,448	257,074
Miscellaneous	412,314	384,861	373,409
April 20	1,004,156	945,289	950,545
April 13	971,730	912,659	949,561
April 6	956,364	919,352	953,907
March 30	967,029	948,743	986,462
March 23	960,698	950,194	1,003,546
Cumulative totals, 16 weeks	15,087,930	14,569,496	15,395,138

The freight car surplus for the period ended April 15 averaged 258,253 cars, including 124,289 coal cars, 86,664 box cars, 26,888 stock cars and 11,996 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended April 20 totalled 65,622 cars, an increase over the previous week of 1,331 cars and an increase over the same week last year of 3,450 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
April 20, 1929	65,622	44,136
April 13, 1929	64,291	44,168
April 6, 1929	63,421	43,580
April 21, 1928	62,172	40,621
Cumulative Totals for Canada		
April 20, 1929	998,514	692,846
April 21, 1928	994,890	635,950
April 23, 1927	963,551	623,790

THE PENNSYLVANIA has recently issued a booklet entitled "Container Car Service." The pamphlet contains a description of the container equipment used in the service and also points out advantages which shippers may expect to enjoy from their employment of this new L. C. L. handling method.

Wabash Freight Traffic a Record

Passenger traffic decrease and lower earnings per ton-mile hold gross revenues slightly under 1926 peak

THE Wabash in 1928 had the heaviest volume of freight business in its history—5.5 billion revenue ton-miles, as compared with 5.4 billion in 1926, the previous record. Revenue ton-miles in 1927 were slightly less than 5.1 billion. Because of the decline in passenger business, however, and a slight decrease in average earnings per ton-mile, total operating revenues were slightly less than in 1926—\$71,072,991 as compared with \$71,693,341 in 1926. Total operating revenues in 1927 were \$67,108,153. The 1928 operating ratio was 73.74 as compared with 76.56 in 1927, 73.18 in 1926, and 73.07 in 1925, which was the lowest ratio attained in any year since the war. These and other figures showing operating results since 1916 are set out in detail in Table I.

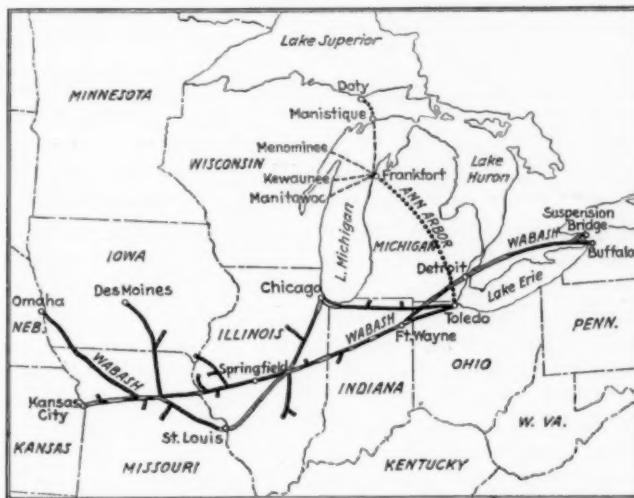
It will be noted that net operating revenues in 1928—\$18,661,423—exceeded those of 1927 by almost three million dollars, but that both 1925 and 1926 showed somewhat higher totals; in neither year exceeding the 1928 total by as much as a million dollars, however.

Lighter Loads Per Car and Increased Empty Mileage a Problem

The volume of freight traffic of 1926 more nearly than that of any other year approached the 1928 total. A comparison of the significant freight operating statistics of the two years should, therefore, provide a fair gauge of the trend of efficiency in handling this business. This comparison is given in Table II. From the figures it at once becomes apparent that the Wabash, in improving its operating performance, has had a mighty obstacle to surmount in the declining average load per car and in the decreasing ratio of loaded to total car miles. Decreases in these indices are, of course, quite general in these days of steady improvement in service to shippers, and slight decreases in them are no more surprising when found than are declines in passenger traffic. Their effect on the Wabash has been particularly marked, as is evidenced by the decline of 4.9 per cent in net tons per loaded-car from 1926 to 1928 and of the ratio of loaded to total car-miles of 4.5 per cent. These factors brought about the condition of an increase of only 1.3 per cent in net ton-miles while gross ton-miles rose 8.9 per cent.

In spite, however, of the handicap of these factors over which the railroad has little or no control, the company succeeded in considerably improving its freight service operating efficiency. In the face of an

increase of 8.9 per cent in gross ton-miles and of 11.6 per cent in car-miles, freight train-miles increased only 7 per cent and freight train-hours actually declined 4.2 per cent. Train-speed, which increased 11.7 per cent to 16.2 m. p. h., was the principal factor in this showing. Freight cars per train increased 4.3 per cent, gross ton-miles per train-hour 13.6 per cent and net ton-miles per train-hour 5.7 per cent. Fuel consumption per 1000



The Wabash and the Ann Arbor

gross ton-miles declined 6.9 per cent and locomotive-miles per locomotive-day rose 10.7 per cent to 75.3 miles.

Reduced Transportation and Maintenance Ratios

In 1928 the Wabash had a transportation ratio (to operating revenues) of 37.7. In 1927 this ratio was 38.6; in 1926 it was 36.6 and in 1925 it was 36.4. The maintenance of equipment ratio in 1928 was 16.6 as compared with 17.7 in 1927 and 17.4 in 1926. The maintenance of way ratio in 1928 was 13.4, as compared with 13.9 in 1927, 13.8 in 1926 and 13.3 in 1925. A significant figure bearing on the maintenance of equipment ratio is that of the cost of repairs per 100 locomotive miles. In 1923 this was \$42.30, abnormally high as the result of the shop strike. In 1924 it had declined to \$26.13 and each year since has seen a further decrease down to \$21.76 in 1928. At the same time that this reduction in costs per 100 locomotive

Table I—Wabash Operating Results, Selected Items, 1916 to 1928

Year	Mileage	Revenue ton-miles (thousands)	Revenue passenger miles (thousands)	Rev. per ton miles, cents	Total operating revenues	Total operating expenses	Net operating revenues	Operating ratio	Net railway operating income	Net after charges
1916	2,519	4,440,861	364,775	.6217	\$37,721,104	\$24,874,417	\$12,846,687	65.94	.....	\$5,390,908
1917	2,519	4,785,375	388,460	.6132	40,471,999	28,468,896	12,003,103	70.34	.....	4,227,105
1918	2,513	4,615,817	399,154	.7474	48,246,411	40,223,947	8,022,464	83.37	.....	2,635,285
1919	2,476	4,027,016	370,888	.8754	48,847,086	44,587,030	4,260,056	91.28	\$3,714,172	2,372,870
1920	2,473	4,566,144	371,437	.9488	59,982,282	58,859,393	1,122,887	98.13	864,445	1,983,943
1921	2,473	3,888,949	294,216	1.1748	59,217,692	50,596,169	8,711,523	85.29	3,863,340	1,281,361
1922	2,473	3,930,797	269,830	1.1171	57,662,496	48,041,297	9,621,199	83.31	4,107,421	1,210,388
1923	2,477	4,673,212	294,369	1.1063	66,617,636	52,033,495	14,584,142	78.11	8,941,275	5,410,874
1924	2,490	4,920,974	284,539	1.0475	65,780,929	50,298,418	15,482,512	76.46	9,347,780	5,474,949
1925	2,524	5,233,547	297,204	1.0572	69,910,301	51,080,424	18,829,877	73.07	12,252,515	7,946,438
1926	2,524	5,376,861	294,281	1.0639	71,693,341	52,465,680	19,227,661	73.18	12,562,083	8,217,487
1927	2,524	5,089,310	266,924	1.0609	67,108,153	51,379,146	15,729,006	76.56	9,661,677	4,763,610
1928	2,524	5,558,198	242,161	1.0586	71,072,991	52,411,567	18,661,423	73.74	11,950,039	6,401,277

Standard return for operations during federal control or average net railway operating income for three years ended June 30, 1917, \$5,826,810.

miles was being obtained, the size and capacity of the road's locomotives were increasing. At the end of 1923 it had 360 road freight locomotives of an average tractive effort of 39,102 lb. At the end of 1928 the number of this class of engines had risen to 409 and average tractive effort to 46,077 lb., or 17.8 per cent greater than the 1923 average. The company had 154 switching locomotives at the end of 1928 with an average tractive effort of 36,642 lb., the latter representing an increase of 12.8 per cent over the average tractive effort of switching locomotives at the end of 1923.

Activity in track maintenance and improvement during the past five years is reflected in the following table:

	1928	1927	1926	1925	1924
Number Tons New 110-lb. Rail Laid	18,917.5	23,542.2	20,494.5	.....	.....
Miles New 110-lb. Rail Laid	109.5	136.2	118.5	.....	.....
Number Tons New 90-lb. Rail Laid	38.4	180.3	2,380.9	25,800.8	15,668.7
Miles New 90-lb. Rail Laid .....	.3	1.2	16.8	182.4	110.8
Number Cross Ties Laid in Main Track	621,399	646,422	798,859	804,790	951,631
Number Cross Ties Laid in Side Track	237,654	218,918	267,115	343,799	242,233
Number Miles Track Ballasted	6.6	14.3	19.6	62.1	.....
Number Miles Track Reballasted	249.6	151.5	282.2	145.7	322.8
Number Miles Ditching	152.1	179.7	220.3	214.9	135.2
Number Miles Second Main Track Built .....	.....	11.8	9.5	16.5	.....
Number Miles Siding and Spurs Built	*24.7	19.2	31.2	47.6	11.4

Note—The above does not include any work done on lines owned by other roads, operated under trackage rights.

* Note—Includes Industry tracks aggregating 5.9 miles built during the year.

Of ballast applied in 1928 approximately 68 per cent was crushed rock, 26 per cent was washed gravel and 6 per cent burnt clay.

Several other improvements designed to increase operating efficiency and improve service which have been made in the past two or three years may be mentioned. Automatic block signal construction has progressed steadily, the route mileage installed in 1928 being 22, bringing the total mileage of line so protected up to 634. A program of replacing pile bridges with permanent structures is being regularly pursued. Flood protection has been provided at a number of points. Long dis-

1925	5,276,309	6,309,847
1926	8,324,093	6,475,417
1927	4,641,484	4,557,613
1928	4,214,685	39,530

Division of Freight Tonnage

Freight tonnage in 1928 was divided as follows: Products of agriculture, 15.28 per cent; animals and products, 4.62 per cent; mine products, 36.77 per cent (bituminous coal, 21.05 per cent); forest products, 4.88 per cent; manufactures and miscellaneous, 34.31 per cent (automotive vehicles, 5.18 per cent), i. e. l. 4.14 per cent. The important increase in tonnage which has

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come in recent years has been in the category of manufactures and miscellaneous. Before our entry into the war—in 1916—such commodities comprised but 23 per cent of total tonnage. In 1920 they amounted to less than 30 per cent of the total and fell to 25 per cent in 1921, since which time their relative importance has, with minor fluctuations, steadily increased. The successful handling of this high grade traffic is reflected in the road's high average train speed and car-miles per day (see Table II).

The road's location in the automobile-producing area which has seen such great growth in recent years has undoubtedly aided it in securing increased tonnage, but this territory is highly competitive and excellent service is necessary if the business is to be retained. The provision of such service for this territory as well as through its important connections at the Niagara frontier and in the Middle West has brought about the road's present favorable position with regard to freight traffic.

Suit Over Dividends

Table I shows net railway operating income of \$11,950,039 in 1928 and net after charges of \$6,401,277. These totals were exceeded in both 1925 and 1926. In 1926, the best year the company has had from a standpoint of earnings, these totals were, respectively, \$12,562,083 and \$8,217,487. Income available for fixed charges in 1928 totaled \$13,585,895 and was 1.89 times these charges. The net increase in the corporate surplus in 1928, after dividends on preferred stock, was \$2,787,421, bringing the total of corporate surplus up to \$43,324,871—which may be compared with outstanding capital stock of \$138,492,967 and funded debt of \$127,705,187.

In January, 1929, the United States Circuit Court of Appeals handed down an injunction against the payment of a dividend on the Class B preferred stock, holding that back dividends on the Class A preferred would have to be paid before dividends could be declared on any of the junior stocks. The Class A stock is non-cumulative, but complainants in the case alleged that dividends on this stock had been withheld even in some years when they had been earned in order to build up the corporate surplus account.

Table II—Comparison of Selected Freight Operating Statistics

	1928	1926	Per cent of change
		Inc.	Dec.
Mileage operated	2,497	2,497	.....
Gross ton-miles (thousands)	16,405,848	15,062,208	8.9
Net ton-miles (thousands)	6,142,982	6,065,631	1.3
Freight train-miles (thousands)	9,505	8,881	7.0
Freight locomotive-miles (thousands)	10,074	9,379	7.4
Freight car-miles (thousands)	452,396	405,192	11.6
Freight train-hours	585,223	610,513	4.2
Car-miles per day	44.8	42.6	5.2
Net tons per loaded car	21.2	22.3	4.9
Per cent loaded to total car miles	64.0	67.1	4.6
Net ton-miles per car day	609	638	4.5
Freight cars per train	48.6	46.6	4.3
Gross tons per train	1726	1696	1.8
Net tons per train	646	683	5.4
Train speed, miles per train hr.	16.2	14.5	11.7
Gross ton-miles per train-hour	28,033	24,671	13.6
Net ton-miles per train-hour	10,497	9,935	5.7
Lb. coal per 1,000 gross ton-miles	122	131	6.9
Loco. miles per loco. day	75.3	68.0	10.7
Per cent freight locos. unserviceable	17.8	15.9	11.9
Per cent freight cars unserviceable	3.0	2.7	11.1

Distance telephone circuits have been furnished to facilitate the operation of the property. A new train yard and engine terminal was placed in service in 1926 at North Kansas City, Mo., and yard improvements have been made at several other points. Modern water stations and coal handling facilities have been installed at several locations. A new steel-car repair shop has been placed in service at Decatur, Ill., and locomotive repair facilities at that point have been considerably improved. The following expenditures for additions and betterments have been made in the years 1924-28:

Additions and Betterments

Year	To Road	To Equipment
1924	\$2,017,045	\$6,300,617

Charles L. Bradley Becomes First Chairman of Erie

Van Sweringen associate will retain also presidency of Cleveland Union Terminals but will relinquish Nickel Plate vice-presidency

CHARLES L. BRADLEY, president of the Cleveland Union Terminals and vice-president of the New York, Chicago & St. Louis, was, on April 26, elected to the newly created chairmanship of the Erie board of directors. Prior to his elevation to the chairmanship Mr. Bradley was elected to a membership on the board, filling the vacancy caused by the withdrawal of Frederick D. Underwood, former president of the Erie.

In retiring from his membership on the Erie board, Mr. Underwood relinquished an association with the road's affairs which had extended over many years. He became its president in 1901 and remained in that position until December 31, 1926, when he was succeeded by John J. Bernet, the present incumbent. Prior to his becoming chief executive of the Erie, however, Mr. Underwood had a varied railroad career from the time he first entered the service as brakeman on the predecessor to the present Chicago, Milwaukee, St. Paul & Pacific. During his subsequent connection with the Minneapolis & Pacific (now the Minneapolis, St. Paul & Sault Ste. Marie) successively as general superintendent of construction, general-manager and vice-president, the property was greatly expanded and Mr. Underwood acquired a considerable reputation as a railroad builder. He has long been recognized as one of the country's most picturesque railroad executives and is also said to represent the last of a preceding generation of railroad leaders. A photograph of Mr. Underwood, together with an extended sketch of his varied railroad career and an outline of his accomplishments as chief executive of the Erie during the quarter century of his incumbency, was published in the *Railway Age*, issue of December 25, 1926, page 1255, in connection with the announcement of his retirement from the latter office.

Charles L. Bradley is a native of Ohio and, upon being graduated from Cornell University, became engaged in the conduct and development of the large business interests with which his father had been identified in Cleve-

land. He is thus a business man and financier of wide experience, who later associated himself with the Van Sweringen brothers when they entered the steam railroad field. This association has remained continuous ever since and Mr. Bradley, therefore, brings to the new office of chairman of the Erie board a close identification with the Van Sweringen transportation enterprises and an intimate knowledge of the future development plans of these interests.

In coming to the Erie Mr. Bradley will relinquish the vice-presidency of the Nickel Plate but will continue to hold the presidency of the Cleveland Union Terminals

with the permission of the Interstate Commerce Commission. In addition to his activities in the transportation field he has been identified with the banking business and, in this latter connection, is a former vice-president of the Union Trust Company of Cleveland. Recently he reorganized the Midland Bank of Cleveland of which he is a director. Finally, as was mentioned in the foregoing, he is also associated in the management of the large Bradley interests in Cleveland. Among these latter are the Cleveland & Buffalo Lake Line of steamships.

This chairmanship of the Erie board of directors was created to permit President Bernet to devote more time to the operating reorganization of the system and to his work as chief railroad advisor to the Van Sweringens in their plans for the formation of a fourth trunk line system. Mr. Bradley, as one of the heads of the Van Sweringen organization, will devote himself to the financial management of the

Erie and such rearrangements as the future may bring.

The new chairman comes into the financial management of Erie affairs at a time when its prospects along these lines are particularly promising. The annual report for the year ending December 31, 1928, shows a net income of \$10,002,884 which, after sinking fund deductions, yielded a profit and loss credit for the year amounting to \$8,614,792. The foregoing figures represent respectively a \$6,490,234 increase over the 1927 net income of \$3,512,650 and a \$6,481,029 increase over the



Blank-Stoller, Inc.

Charles L. Bradley

1927 balance of \$2,133,763 available for crediting to profit and loss. This improvement in income, amounting to more than \$6,000,000, was effected with but a \$2,498,188 increase in gross revenues or rather the source of two-thirds of the augmented net is found in the \$4,901,723 reduction in operating expenses.

The same tendencies are manifest in the current year when the net railway operating income of the first two months was reported as \$2,769,800, as against a total net railway operating income of \$1,360,825 for January and February, 1928. This latter has been accomplished through further advances in operating efficiency as indicated in the February statistics recently published. With but an increase of 344 train miles over February, 1928, the Erie, during the corresponding month of the current year, performed 210,984,000 more gross ton-miles, which yielded 120,700,000 more net ton-miles than were produced in February, 1928. Comparison of other factors for the same months of the two years reveals that gross ton-miles per train hour rose from 28,789 during February, 1928, to 31,928 during February, 1929; gross tons per train increased from 2,336 to 2,577; net tons per train from 965 to 1,103; net ton-miles per car day from 580 to 671 and pounds of coal per 1,000 gross ton-miles from 136 to 129.

New Process Promises Cheaper Wrought Iron

RECENT years, and more particularly recent months, have brought about outstanding developments in the process of manufacturing wrought iron, which are expected by many to increase production, reduce the price of the commodity and improve the quality of the product. In this process, which is controlled by the A. M. Byers Company, Pittsburgh, Pa., the pig iron is melted in a cupola having a capacity of about 20 tons an hour, the Bessemer pig iron having an analysis of 1½ per cent silicon, 1 per cent manganese, 0.05 per cent sulphur, and 0.08 to 0.10 per cent phosphorus. The metal in the cupola absorbs a small amount of sulphur from the coke, and since this element is undesirable, the liquid metal is subjected to a special process while being poured into the ladle in order to reduce its sulphur content.

Roughly, about two tons of metal are tapped at one time. The metal is then poured into a converter for refining, following which it is poured into a bath of slag, this latter process being known as "shotting." When the stream of iron comes into contact with the slag, the gases liberated cause millions of tiny explosions, which, in turn, cause the metal to be broken up into pea-size globules, exactly as in the puddling furnace when the metal is "coming to nature." It is said that the reactions in the new process are similar in every respect to those which take place in hand-puddling, except that they are faster and more uniform.

When the necessary reactions are completed, the ladle or thimble is raised and tipped until the excess slag has been poured off. The material remaining in the bottom of the thimble is called the sponge, from which a spongy ball is formed, weighing approximately 2,200 lb. The composition of the material in this spongy mass is similar to that in the ball obtained in the puddling furnace. It is placed under a hydraulic press to squeeze out surplus slag and give the shape of a block having a cross-section of 12 in. by 14 in., and a length of 5 ft. This is then passed through a rolling mill

until it reaches the shears in the form of a bar approximately 200 ft. long by 4 to 8 in. wide and ¾ in. thick.

With the new process, it is said that as much wrought iron is produced in 20 min. as could be turned out by



"Shutting"—The Refined Metal Being Poured into a Bath of Silicate Slag

two puddlers in a 10-hr. day. It is also claimed that pipe made from this new process wrought iron is superior to that made from hand-puddled iron.

THE DELAWARE, LACKAWANNA & WESTERN publishing a brief sketch of the history of its ferry boat line between New York and Hoboken, which line began business in 1775, says that the boats of this line, having three landings on the New York side and two on the New Jersey side, cross the Hudson River 810 times every 24 hours. In the year 1928, these boats carried about 27,000,000 passengers and nearly 3,000,000 vehicles. The Lackawanna operates in New York Harbor, including both passenger and water craft, 258 vessels. The Hoboken line ran its first steamboat in 1811, and the Hoboken Steamboat Ferry Company was incorporated in 1821.

* * *



Dearborn Street Station, Chicago. Showing Chicago's "Loop" District in the Background

Academy of Political Science Considers Consolidation

Discussions at semi-annual meeting in New York outline present status and future possibilities in railway unification

RAILROAD Consolidation" was the topic assigned for discussion by the several speakers at the semi-annual meeting of Academy of Political Science, held on April 24 at Columbia University, New York. The meeting was conducted in three sessions with Walker D. Hines, director general of railroads, 1919-1920, John J. Esch, former Interstate Commerce Commissioner, and William L. Ransom, ex-justice, City Court of New York, each presiding in turn.

Present Developments

In opening the discussion, Chairman Hines outlined railroad unification developments up to the present time. He pointed out that authorities granted in these cases have permitted acquisition by stock control, by lease or by operating contract. From this the chairman proceeded to differentiate between the foregoing methods and the method provided in the Transportation Act which contemplates complete consolidation through vesting strict legal title and ownership of the railroad involved in a single corporation. "The Commission," he added, "has not yet undertaken to proceed according to the latter method because it involves, according to the Commission's conception, the necessity for first preparing a plan for consolidation of all the railroads in the country into a limited number of systems and the Commission has not yet been able to make such a plan."

"The Transportation Act", Mr. Hines concluded, "made a very clear distinction of procedure between the unification through stock control or lease and the other form of combination through complete consolidation of legal ownership. Since under the law all forms of railroad combination must be by purely voluntary action of the railroad companies involved, and since Congress believed that railroad combinations, when found by the Commission to be in the public interest, ought to be promoted so as to facilitate public regulation, realize economies, and improve transportation service, it is most fortunate that Congress gave the power, and the Commission has exercised it, to make important beginnings in this direction by unifications through stock ownership or lease without postponing all action until the distant day when a consolidation plan can be completed for the entire country and when final consolidations of complete technical legal ownership are carried out."

Species of Unification

J. P. Blair, general counsel, Southern Pacific, discussed "Processes and Results of Unification." This speaker defined three species of unification, i. e., unification of traffic under pooling agreements, unification by stock control or lease, and consolidation of franchises into ownership by a single corporation. The first and

third were eliminated from the particular discussion which came under the general head of "Unification Under the Present Law" because "the railroads have not yet availed themselves of the opportunity to make pooling agreements and cannot avail themselves of provisions for consolidation until after the adoption by the Commission of a final plan of consolidation, a task the Commission has not yet been able to accomplish."

Benefits Realized from Unification

Mr. Blair thus continued to explain developments along unification lines brought about by the acquisition by railroads of other lines through the stock control, lease or operating contract methods. He selected several examples of unifications so effected and found that the cases chosen had shown such results as: Reduced operating expenses and increased efficiency, resulting in better service at less cost; avoidance of capital expenditures that would otherwise have been necessary and of duplication of such expenditures; creation of more effective and beneficial competition in the place of competition eliminated by the common control; enabling states and their citizens to get the benefits of a common control desired by them, but prevented by restrictions of their own constitutions; rescue of a large railroad system from a sentence of death imposed by a court under compulsion of Sherman Law.

Obstacles to Consolidation

Emory R. Johnson, dean of the Wharton School of Finance and Commerce, University of Pennsylvania, read a paper entitled "Obstacles to Consolidation in the Eastern Territory." An abstract of this paper follows:

The Commission realizes that it requires a greater measure of prescience than it possesses to forecast the logical grouping of railroads, and that, however wisely the Commission might act today in the adoption of the general plan, it would be obliged in passing upon future applications for individual mergers to deviate from the plan adopted in advance. It is also quite certain that the definite allocation of railroad systems to designated consolidations in advance of their being brought together would increase the price demanded by individual railroad companies for their property when they entered a consolidation. It is generally recognized both in and out of Congress that it is necessary to substitute for the merger sections of the Act of 1920 a new plan for the government regulation and guidance of railroad consolidation.

Opposition of Local Business Interests

One of the obstacles that may prove to be difficult to overcome in bringing about the consolidation of railroads is that created by opposition of the local business interests that for various reasons, may desire the con-

tinuance of the separate existence and activity of such railroads as may be considered to be of special local importance.

If the railroads in the eastern territory are eventually consolidated into four large systems it is quite certain that one of the four will be the Baltimore & Ohio system and that this strong system will include the Western Maryland, a road that is relatively small and financially weak. However, certain business interests in Baltimore desire that the Western Maryland shall remain independent of the Baltimore & Ohio, the hope being that Baltimore may thereby ultimately have a strong third trunk line system.

Conflicting Interests and Aims of the Eastern Trunk Lines

The most serious obstacles to be overcome in bringing about the consolidation of railroads in the eastern territory are neither those due to the provisions of the Act of 1920 nor those created by the opposition of local business interests, but are those that result from the historic rivalries of the trunk lines themselves.

These conflicting interests can hardly be reconciled by negotiations of the trunk lines with each other. Such negotiations have been in progress for five years and thus far without success. It will apparently be necessary for each of the four proposed systems to file petitions with the Interstate Commerce Commission setting forth such distribution of the several railroads as the several petitioners desire. There will be conflicting claims which the Interstate Commerce Commission will have to adjust, and it will be necessary for the Commission to decide as to the allocation of a number of the individual lines.

The Baltimore & Ohio and the Chesapeake & Ohio have taken the lead in bringing definitely before the Interstate Commerce Commission the task of deciding upon the consolidation of the railroads in the eastern territory. Each petitioner has enumerated the roads which it wishes to include within its system and has asked the Commission whether it approves of the proposed grouping. It requests the Commission to designate what changes, if any, are deemed necessary in the proposed allocation of the several lines. The petitioners also offer to endeavor to acquire such connecting short lines as in the judgment of the Commission should be included in the proposed consolidations.

Probable Results of Merger Moves

The probable result of the action taken by the Baltimore & Ohio and the Chesapeake & Ohio petitioners will be that the New York Central will file with the Commission a petition setting forth the roads it desires to include in its future system. Ultimately the Pennsylvania will doubtless petition the Commission for approval of such grouping as it desires. It is not to be expected that the Commission will act upon its own motion to force the eastern lines to consolidate into four groups or any other number of systems. The Commission will quite certainly limit its action to propositions put before it by the interested trunk lines.

Among the other speakers listed were: Pierpont V. Davis, vice-president, National City Company, New York; Representative James S. Parker, of New York; W. N. Doak, vice-president, Brotherhood of Railroad Trainmen; Bird M. Robinson, president, American Short Lines Association, and United States Senator Fess of Ohio. Discussions of the papers were led by Winthrop M. Daniels, Thomas DeWitt Cuyler, Professor of Transportation, Yale University, and Alfred

P. Thom, general counsel, American Railroad Executives and American Railway Association.

President Willard of B. & O.

The final paper, entitled "The Status of Consolidation" was presented by Daniel Willard, president, Baltimore & Ohio. An abstract from Mr. Willard's discussion follows:

The consolidation provision in the Transportation Act, as it stands today, was not urged or put forward by the railroads, as a whole, although it may be that some of the railway managers were in favor of such legislation. Senator Cummins of Iowa had as much to do with framing the act and procuring its passage as anyone, and I am certain that Senator Cummins would not have supported the act unless he felt quite certain that by doing so he was promoting the interests of the people at large, and properly so.

In my opinion, the policy concerning consolidation as set forth in the Transportation Act is economically sound and if carried out as Congress evidently expected and desired, I believe the result will be generally satisfactory.

Doubtless if the subject were being considered *de novo* by Congress today, a more easily workable provision could be drawn than the one which is now a part of the Transportation Act. Even so, in my opinion it is quite possible to accomplish under the existing act what Congress had in mind, and this is not to say that certain modifications of the act which have been suggested might not simplify the process and expedite progress towards the complete working out of the policy.

There is nothing in the act itself which enjoins the railroads to do any particular thing towards bringing about consolidation. Such instructions or directions as the act contains are all addressed to the Interstate Commerce Commission. The Commission, in the terms of the act, was definitely instructed to proceed forthwith and prepare a tentative plan for the consolidation of all the railroads in the United States into a limited number of groups.

Delay of Final Plan Unfortunate

The act also directs the Interstate Commerce Commission to prepare and publish a final plan after having terminated its hearings on the tentative plan, but this latter duty the Commission has not yet performed, although more than five years have elapsed since the hearings were closed. The task of preparing a final plan for the consolidation of all the railroads into a limited number of groups is a very complex and difficult one, and, no doubt, Congress realized that fact. Nevertheless, it is most unfortunate that the final plan was not long ago published, as the law requires.

The Transportation Act is a public document and immediately after its passage became a matter of public knowledge. At the time when the law was passed there were upwards of 2,000,000 men and women in the employ of the railroads of the United States. Most of them, certainly the majority of them, expected to remain in the service of the particular company by which they were then employed during the working period of their lives, and they felt able in very considerable degree to visualize the wages or salary which they would continue to receive, the duties which they would probably perform, and the place where they would probably have their homes as long as they remained in service.

With the passage of the consolidation provision of the act this situation was very greatly changed. It

would, of course, be impossible to take several hundred separate and independent railroad companies and merge them into twenty or thirty systems, we will say, without making many changes which would have more or less effect upon the duties and the home location of those in the employ of the particular companies which were likely to lose their identity, and the effect of this was, of course, to create a greater or less degree of uncertainty in the minds of such men and women. The fact that such a change was impending was not without influence upon those who were contemplating entering the railway service. I feel that I am quite within the mark in saying that the future of three-fourths of all the officers and employees in the service of the railroads seemed to them less certain and, consequently, less attractive after the passage of the act than it did before.

We will agree, I am sure, that if the facts are as I have stated, the situation so developed was an unfortunate one. That condition has existed in varying degree during the ten years that have elapsed since the passage of the act.

Should Safeguard Employees

It is my thought that in the consummation of any plan of consolidation or unification involving the Baltimore & Ohio which the Commission may approve, the Baltimore & Ohio should undertake to safeguard the interests of all its employees. More specifically this means that every man employed by the Baltimore & Ohio should, so far as possible and justifiable, be retained in the service of the company in the same work and at the same compensation, and that this same treatment should be extended to the employees of other companies which may be unified with the Baltimore & Ohio. In the event that because of such unification it shall become necessary or economically desirable to combine any of the functions of the properties constituting the unified system, or through the modification of existing operations or practices to suspend or terminate certain classes of employment at certain points, the Baltimore & Ohio should undertake to the best of its ability to provide similar or equivalent employment for such employees at other points and to assist in their relocation. I may add that in the working out of this same problem by the railroads in England, the obligation of the carriers to their employees has been recognized and defined by act of Parliament, and the matter has been dealt with along lines such as I have just indicated. To do less than this would be unjust to a large group of deserving men and women who are now looked upon as semi-public servants. The public interest, in my opinion, does not require, nor would the public itself desire to receive, benefits derived from the unjust treatment of those who now man and operate the railroads.

There is another phase of the situation growing out of the unsettled status of consolidation which has been equally harmful and is becoming increasingly more so. The Baltimore & Ohio Company will, of course, be affected in some manner by the working out of the consolidation policy, but because of the size and location of that property the Baltimore & Ohio, in all of the plans that have been suggested for the eastern region, has been made the basis of one of the groups proposed. But even so, that company has not escaped the influence of the uncertainty of the situation as a whole.

Uncertainty Hampers Development Plans

The Baltimore & Ohio management, for instance, was able in the past, before the passage of the Transportation Act, to decide with reasonable promptness mat-

ters pertaining to the future needs and development of that property. Its officers could plan intelligently for the care of the additional business which might be expected in the future, but as conditions have actually been since the enactment of the consolidation provision it has been quite impossible to deal understandingly and definitely with many of the problems which constantly arise. I have in mind questions affecting location and development of shops, the purchase of additional motive power and equipment, the possibilities of a greater use of existing facilities and so on through the entire list.

It may be said that in spite of this the railroads, since the passage of the Transportation Act, have spent roundly \$600,000,000 a year for enlargements and betterments. But even so a much larger sum might well have been expended, and, in my opinion, would and should have been expended, but for the uncertainty of the situation which I have been discussing.

I think it is generally admitted that during the last four or five years the railroads of the United States as a whole have given a more dependable and efficient service than ever before, and it has been pointed out by economists, public officers and others that this has been the means of saving millions, even billions, of dollars to industry and the public generally. It is certainly to the best interest of the country as a whole that the service of the railroads should be maintained at the highest possible standard. It is quite certain that it will not be maintained at that standard if the period of existing uncertainty is too much prolonged.

I do not expect that there will immediately be realized as the result of such consolidation as may be made, the large savings from operation which have been suggested by some, promised by others and, perhaps, expected by all. Consolidation of the kind indicated in the act will, undoubtedly, result in ultimate economy, I might say in substantial economy, but the chief and more immediate benefit to be derived from such a plan will be the improved service which will be possible and which, of course, will inure directly to the advantage of all those who use or benefit by rail transportation.

If the railroads in the United States were all combined in twenty or thirty groups or systems, each co-terminus with the rate region in which it was located and each group so built up as to afford it reasonable equality of opportunity in originating traffic, as well as in its interchange and delivery, such an arrangement would very greatly simplify the problem of railroad regulation as it is today.

Adoption of Consolidation Plan Would Eliminate Need for Recapture

Under such an arrangement there would no longer be any real reason for keeping in the act the provision for recapture by the government, of one-half the earnings of the railroads above six per cent, upon the value of their property used for transportation purposes. I happen to know that Senator Cummins himself expected that when consolidation should have been brought about that the recapture provision of the act would be repealed, there being, in his opinion, no longer any occasion for it in our system of regulation.

Because of the adverse effect which the uncertainty of the situation has had and is having upon the railroads, some of the managers in the different groups have endeavored to work out a voluntary agreement which it was hoped would meet with the approval of the Commission. This duty was not imposed upon the railroads by any of the terms of the act. The railroad

managers who have given much time to the finding of a solution have been prompted in their efforts by a desire to see an uneconomical and even wasteful situation brought to a satisfactory conclusion. The efforts which the railway managers have made in this connection have so far failed to accomplish any substantial result.

The Commission was directed by Congress to do a definite thing, which, if done, I am sure would have been most helpful in the solution of this problem. The Commission has not yet done the thing which it was directed to do and until it acts and by so acting indicates more clearly the kind of a program it thinks should be followed and which it might be willing to approve, I doubt if any very considerable progress will be made. There is reason to believe, however, that the Commission is taking renewed and deeper interest in this matter and I hope that within the next twelve months a substantial beginning, at least, towards a solution of the problem will be made.

Air Brake Association Meets at Chicago

THE Air Brake Association held its thirty-sixth annual convention at the Hotel Stevens, Chicago, on Tuesday to Friday, inclusive, April 30 to May 3, with a registration of approximately 560. After the invocation, Erwin R. Brigham, vice-president, North American Car Corporation, addressed the convention in behalf of the Chicago Chamber of Commerce. President H. L. Sandhas, general inspector, Central Railroad of New Jersey, followed Mr. Brigham with the customary presidential address, in which he spoke of the need of the association maintaining its reputation as an educational organization. He stated that the association must achieve its purpose; namely, high efficiency in air brake service, in order to keep it in creditable standing with the railroad industry. It was only through the actual accomplishment, evident to the executive and mechanical department heads, that the railroads could be induced to send their men to conventions.

The first paper presented for discussion was a committee report on What Is the Best Material for Air Brake and Air Signal Piping? This was followed by papers and reports on the following subjects: Distributing Valve Location, Maintenance and Piping, by the St. Louis Air Brake Club; Automatic Speed Control and Automatic Train Stop Equipment, by F. H. Nicholson, engineer, Union Switch & Signal Company; Slid Flat Wheels in Passenger Train Service—Causes and Remedies, by the Pittsburgh Air Brake Club; address by J. M. Fitzgerald, assistant to chairman of the Committee on Public Relations of the Eastern Railroads; Operation and Maintenance of Engineer's Brake Valve, by the Central Air Brake Club; Gas-Electric Rail-Car Brakes, by Northwest Air Brake Club; Car Retarders, by L. Richardson, mechanical superintendent, Boston & Maine; Maintenance of Brake Equipment on Gas-Rail Cars, by the Manhattan Air Brake Club; committee report on Recommended Practice, Main Reservoirs, and on the Exclusion of Dirt and Moisture from Passenger-Brake Cylinders.

Abstracts of some of the papers and addresses, and an announcement of the election of officers will appear in a later issue.

Looking Backward

Fifty Years Ago

The long expected decision of the United States Supreme Court in the controversy between the Denver & Rio Grande and the Atchison, Topeka & Santa Fe for the possession of the Grand Canyon of the Arkansas has been rendered, giving the Rio Grande the prior right-of-way over the route through the canyon. This prior right, which a circuit court had given to the Santa Fe, is subject to the Act of 1875 relating to joint occupancy with other roads.—*Railway Age*, May 1, 1879.

The Canadian government having given its consent to the Canada Southern Bridge Company for the construction of a tunnel under the Detroit river near Amherstburg, Ont., for the Canada Southern [now part of the Michigan Central], work was formally begun on April 23. The permit for the construction forbids the use of coffer dams and provides that the work must be carried out by the boring process. The length of the tunnel proper will be 6,300 ft. and the cost of construction is estimated at \$1,500,000.—*Railway Age*, May 1, 1879.

An automatic, electro-magnetic apparatus, which provides for protection against accidents that may result from the disobedience of signals by the locomotive runners, was exhibited at the last International Exhibition in Paris by the Northern Railroad of France. The usual semaphore signal, when set at danger, acts to charge a fixed contact between the rails with positive electricity. When a metallic brush on the locomotive passes over the contact a current is sent into an apparatus on the locomotive, weakening the power of the magnet, which normally holds a valve closed, causing a whistle to blow in the cab and setting the brakes on the train. The Northern has equipped about 300 locomotives with this device.—*Railway Gazette*, May 2, 1879.

Twenty-Five Years Ago

W. H. Williams, assistant to the general manager of the Baltimore & Ohio at Baltimore, Md., has, at the age of 30 years, been appointed superintendent of transportation of the St. Louis & San Francisco.—*Railroad Gazette*, May 6, 1904.

A forty-year review of changes in freight tariffs, published by the Interstate Commerce Commission, shows that since 1887 the number of freight classifications has increased an average of 274 per cent. In Western Classification territory the number of items has increased from 1,672 to 8,044 or 381 per cent.—*Railway Age*, May 6, 1904.

Ten Years Ago

The record-breaking surplus of freight cars, which on March 1 totaled more than 450,000 idle cars, is now being reduced by an improvement in the volume of traffic, particularly in the grain movement and by the opening of the lake coal and ore movement, and the surplus of cars at the present time is something over 300,000. The largest surplus of freight cars previously recorded was in April, 1908, when the total was over 413,000.—*Railway Age*, May 2, 1919.

The "Sailing Day" plan is dead. Despite masses of figures, statistical reports and thousands of actual service cases marshalled in its support, the plan for forwarding package freight less frequently than once a day, instituted just before the taking over of the railroads by the government, died on April 8. The most definite objections raised against the plan by shippers were based on the refusal of the carriers to accept freight on other than the sailing days.—*Railway Age*, May 2, 1919.

Communications and Books

South Australian Progress

ADELAIDE, AUSTRALIA.

TO THE EDITOR:

The accompanying illustration shows the transition from the old operating conditions to the new on the South Australian Railways.

You will notice the small car previously used for wheat loading, with a tare weight of 5 tons, 5 cwt., and a net of 8 tons, in comparison with the new type of gondola car, tare,



18 tons, 1 1/4 cwt., load, 40 tons, permissible load, 44 tons. We have also had built a new type of flat car, with a tare weight of 17 tons, load 50 tons, permissible load 55 tons. A normal load is about 660 bags of wheat, or approximately 53 tons. Inasmuch as all the wheat in this country is shipped in bags, we have found these flat cars most economical in the handling of our wheat shipments on broad gage lines.

W. A. WEBB,
Commissioner, South Australian Railways.

New Books

Holiday Haunts. Illustrated with photographs and maps. Bound in paper, 936 pages, 8 1/2 in. by 5 1/2 in. Published by the Great Western Railway of Great Britain, Paddington Station, London. Price six pence.

This elaborate guide book to holiday resorts served by the Great Western is now published in its 1929 edition. A survey of the issue will immediately convince the investigator that the declared objective has been attained as set forth, i.e., "To afford holidaymakers of all classes and every nationality such information as will enable them so secure a maximum of change, rest, pleasure or sport at a minimum of expenditure and fatigue or to select a place of residence suitable to their individual requirements". Here the traveler in Great Britain will find a wealth of travel and hotel information and advertisements set forth in a most pleasing manner amidst some 350 scenic photographs of the territory surveyed. It is indeed one of the most fascinating volumes of the world's railway travel information library.

The New Industrial Revolution and Wages, by W. Jett Lauck. Bound in cloth, 308 pages, 7 3/4 in. by 5 1/2 in. Published by Funk & Wagnalls Company, New York. Price \$2.50.

The author here presents a survey of post-war developments, in wage theories and practices of American industry. Marked advances in plant operating efficiency, he finds, have brought about a clearer visualization by industrialists of the distinction between wages and labor costs. That the former may well increase simultaneously with declines in the latter, Mr. Lauck points out, is an economic principle which is becoming more generally accepted as the basis of wage policies, and with such general acceptance the purchasing power of the masses has been augmented to the point where it is responsible for the country's present era of prosperity.

These developments of wage theory and practice from the pre-war basis of determination by supply and demand through the various later stages where such factors entered as "cost of living," "subsistence minimum," "health and modest comfort," "living wage," and "cultural wage" are traced in the utterances of industrial, labor and political leaders and economists. Extensive quotations from public addresses and writings of these

leaders and students of labor are interpolated throughout the book. Railroad men will recognize the author as the economist prominently associated with the railway unions in wage controversies several years ago.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Aircraft Year Book 1929. Includes description of aircraft and services, chronology of air service development, airway maps and statistics of operation. Illustrated. 400 p. Pub. by Aeronautical Chamber of Commerce of America, Inc., New York City. \$5.25.

Mediterranean Fruit Fly Quarantine, by U. S. Dept. of Agriculture Plant Quarantine and Control Administration. Notice of Quarantine No. 68 effective May 1, 1929. Regulates shipments by common carrier from Florida restricting interstate movement of citrus fruits, vegetables and so on. (Note: Bulletin No. 640 of the Department of Agriculture describes this fly, its characteristics, distribution, and the damage it has done in various parts of the world.) 12 p. Issued by U. S. Department of Agriculture, Washington, D. C. Apply.

Periodical Articles

Backaches Go Out of Railroading, by Charles Frederick Carter. Some reminiscences of what was expected in the old days and now. "...the greater part of railroad operation is automatic and the rest is accomplished by pushing buttons and looking busy." p. 55. *Nation's Business*, May 1929, p. 55-58, 134.

Diamonds as Metal-Cutting Tools, by C. L. Bausch. "The speed of turning is practically independent of the material being turned, the company having turned everything from soft babbitt to hard bronze that a steel tool would hardly touch, at substantially the same speed provided vibrations did not occur . . . Costs can be reduced greatly as it is possible to turn thousands of pieces with one setting of the tool . . ." p. 362. *Mechanical Engineering*, May, 1929, p. 366-362.

The Facility Factor in Selecting Transportation Service, by Wayne E. Butterbaugh. "Since the railroads furnish the basis of our domestic transportation system, their physical facilities for attracting freight traffic are considered first." p. 34. *Distribution Economy*, April 1929, p. 34-37.

Federal Legislation Concerning Railroad Employees. Discussion of "Constitutional powers" p. 48. "Employees engaged in interstate commerce" p. 48-49, "Contract of employment", p. 49-50, "Hours of Labor" p. 50-51, "Wages" p. 52, "Employer's liability for injury to employees", p. 52-55, "Labor disputes" p. 55-64, "Safety and health" p. 64-73, "Housing" p. 73-74. "The above analysis distinguishes between the powers of the Federal and State governments . . . points out the fields of legislation upon which Congress has acted and in which therefore the State power has ceased to exist . . ." p. 74. *Monthly Labor Review*, April 1929, p. 48-75.

Store Door Delivery. "British practice" p. 342-343, "Canadian practice" p. 343, "Experiences in the United States" p. 343-344, "Present practice in the United States" p. 344-346, "The Railroads' point of view" p. 346-348, "From the shippers' and consignee's point of view" p. 348, "Conditions of service" p. 348-349, and "Objections to store door delivery" p. 349-350. *Harvard Business Review*, April 1929, p. 342-350.

The Transpyrenean Railways, by Marcel Garau. History and descriptions of the lines connecting France and Spain. Maps, p. 373, 376-377. "Expected results" p. 383-384. *Bulletin of the International Railway Congress Association*, April 1929, p. 373-384.

Odds and Ends of Railroading

Highway Competition Fifty Years Ago

While the Denver & Rio Grande passenger train was on its way to Denver on Saturday from Pueblo, Engineman Wm. Ryan counted 75 pedestrians with bundles on their shoulders bound toward Denver, and 35 going toward Pueblo.—*From the Railway Age of April 17, 1879.*

Pastor Turns Engineman

Many railroaders have become pastors, but the reverse is not so often true. Rev. J. H. Standberry, pastor of a Baptist church in Asheville, N. C., has returned to his former profession of driving an engine on the Southern. He states, however, that, as soon as his health permits, he will return to his ecclesiastical labors.

Town Board to Refund 80 Cents To the New York Central

Through a slight error in property valuation, the town board of Greenburg, N. Y., has ordered a refund of 80 cents to the New York Central in settlement of a claim that the company's right of way had been excessively assessed in this year's tax bill. Investigation proved that in copying the valuation of the property in question, \$3,042 was put down this year instead of \$2,042, and that the \$2.20 tax levied should be reduced as claimed.

The Claims of Springfield

The Missouri Pacific claims a service record for Springfield, Neb., and defies any other town of its size to equal it. Springfield has four real veterans. J. C. Geib, agent and telegrapher at Springfield for 39 years, has a service record of 46 years on the M. P. Milton Beckner, pumper at Springfield, has been with the M. P. for 50 years, while Fred Hotz, retired pumper, and John Hogarth, section foreman, both of Springfield, are mere youngsters, with 33 and 34 years' service, respectively. These four men, in the same small town, can look back upon a combined 173 years' service with the M. P.

Receives Ford Pass

M. H. Westbrook, superintendent of the Grand Trunk Western shops, at Battle Creek, Mich., is the proud possessor of one of Henry Ford's personal passes, his pasteboard bearing the number 351. The possessor of one of these passes can visit any of the Ford plants or the D. T. & I. shops without making advance arrangements. Mr. Ford gave Mr. Westbrook this pass shortly after he had visited the Battle Creek shops of the Grand Trunk on a tour of inspection. Mr. Ford, it is rumored, got some labor-saving ideas in the Battle Creek shop, his interest being centered on the air-hose repair facilities which Mr. Westbrook had designed. Mr. Ford's comments on this machine were highly complimentary.

He Believes in Work

W. C. Cox holds the following positions at the Pere Marquette's Wyoming shops in Grand Rapids, Mich.: Chief engineer of the power plant, chief electrician of the shops, fire chief, steam fitter's foreman, tractor and truck maintenance foreman, coal dock and sand house foreman and "head gardener." Mr. Cox has completed a greenhouse on the shop grounds and in this house he raises more than 100 varieties of flowers. This greenhouse which measures 20 ft. by 30 ft., is heated by steam and lighted by electricity. Flowering plants are raised for the decoration of the shop grounds and also for the adornment of the various sections of the power house, such as the boiler room, engine room and basement pump room.

White Man's Magic

The building of the railway bridge over the gorge immediately below the Victoria Falls, in South Africa, was a matter of great concern to an old Batoka chief who lived nearby.

Together with his councillors, the old man used to sit on the cliff watching the progress of the work. When the work was begun, he said: "These white men are very clever in many things, but I am an old man, and I know that as soon as they tie more 'zinbe' (iron) over the water it will, of course, fall into the hole beneath." The work went on and the arms of the bridge were successfully joined up. Recovering from the disappointment this fact caused him, the old fellow declared, quite contentedly, that when the white men put a train on the bridge, both it and the train would fall into the gorge. He, with his whole staff, attended to witness this disaster, but it did not materialize. How he "saved his face" is not recorded.—*Daily Mail, London.*

Delay Train to Save Lives

The fact that a Central Vermont freight train was delayed 20 minutes, figured more prominently in a modest report submitted to the superintendent and general manager, than the fact that the reason the train was delayed was to allow the crew to assist a mother and her two children to safety from their home, which was destroyed by fire. When the officials heard the reason for the delay they asked for further details and learned that when the crew of the freight passed the home of Charles Witkus near Three Rivers, Mass., they noticed the building was ablaze, and brought the train to a stop. Engineer M. J. Murphy, assisted by Conductor J. E. Powers, Brakemen C. G. Shippey and F. Murphy and Fireman B. K. Bogue, ran into the burning house and carried Mrs. Witkus and her two children to safety. They then turned their attention to the furnishings and succeeded in saving a considerable quantity of furniture. When they were ready to continue their run, they found they had lost 20 minutes and so reported.

Oldest Active Railroader?

David McNitt, aged 94, crossing watchman for the Wheeling & Lake Erie at Toledo, Ohio, whose likeness appears in these columns, claims to be the oldest active railroad man in the



Still Active at 94

country, if not in the world. McNitt was a fisherman until 1897, when the lure of the rails overtook him and he has been on the job ever since. Is there anyone to dispute his claim?

NEWS of the WEEK



Great Northern Terminal at Spokane, Wash.

MILTON R. STAHL, an attorney in St. Louis, Mo., has been appointed chairman of the Missouri Public Service Commission, his term to expire on April 15, 1935. Mr. Stahl replaces Dudley Calfee as a member of the board and succeeds Almon Ing as chairman. Mr. Ing is still a member of the Board.

THE TRANSPORTATION CORPS, A. E. F. Association will hold its tenth annual meeting in Chicago on May 25. The organization is composed of officers who served in the military transportation service on both land and sea during the World War. General W. W. Atterbury, president of the Pennsylvania, is president of the society and S. M. Felton, chairman of the board of the Chicago Great Western is vice president.

THE WAGE CONTROVERSY between the Southern Railway and members of the six shop crafts organizations, which had resulted in a strike vote, has been referred to arbitration by an agreement reached last week at a conference between representatives of the road, the employees and the United States Board of Mediation. A board of arbitration has been appointed and an agreement reached that hearings shall be started not later than May 23. The award is to be retroactive to March 1.

N. P. Land Grants

The joint congressional committee appointed to investigate the Northern Pacific land grants has reported to the Senate a bill, S. 669, directing the Attorney General to institute proceedings to procure a final and complete determination of the respective rights of the United States and the railway company to the end that the grants shall be finally adjusted. A similar bill, H. R. 2151, has been introduced in the House and referred to the committee of the whole as most of the regular committees have not been organized.

California Commission Forms Safety Division

The Railroad Commission of California has created a safety division for the express purpose of promoting safety in the operation of transportation utilities. H. L. Engelhardt, service inspector has been promoted to safety engineer and

is in charge of the new division. The division will investigate serious accidents and will study accident prevention, the reduction of fire hazards on railroads and the elimination of clearance hazards. It will also study all matters relating to railroad signaling and kindred matters.

Pennsylvania Medals for Valor

At the regular meeting of the directors of the Pennsylvania in Philadelphia, on April 24, President W. W. Atterbury presented to eight employees heroic service medals, as authorized by the directors, in recognition of unusual courage or bravery in saving lives. The recipients of the medals were Fred I. Stillwell, locomotive fireman; Angelo Viola, track walker; Philip H. Gingras, crossing watchman; Harold W. Lindsay, road patrolman; David G. Murhamer, yard brakeman; Bernard J. Galbraith, freight brakeman; William C. King, freight brakeman and J. B. Pickle, extra conductor.

Changes in Railway Mileage

The slight increase in route mileage on American railways in the last decade and a half is shown in the survey of the National Bureau of Economic Research which will be published with the report of the Committee on Recent Economic Changes of the President's Unemployment Conference. The survey deals with significant economic trends since the close of the war. The aggregate length of all American railroads in 1913 was 253,470. In 1916 it was 259,211. Since then the additions have been largely offset by mileage abandoned, the total operated miles in 1927 being 259,639. Large gains in total trackage, however, are noted. The data were gathered under the supervision of Professor William J. Cunningham, Harvard University. The total length of track in 1913 was 379,508 miles; in 1927 it was 424,737 miles.

North Western Shop Employees' Wages Advanced

Wage increases aggregating \$1,200,000 and affecting 10,000 men have been awarded shop employees by the Chicago & North Western, effective May 1. Under the agreement mechanics receive an increase of five cents an hour, helpers from

three cents to five cents, helper apprentices five cents and regular apprentices from one-half cent to five cents. No increase was granted coach cleaners. With these advances, which are practically the same as those granted by other western carriers, the going rates of pay for the various classes of employees are: mechanics 80 cents an hour, freight carmen 73 cents an hour, helpers 55 cents and 57 cents, helper apprentices 57 cents and 67 cents, and regular apprentices from 32 cents to 62 cents an hour.

Consolidation Bill Re-Introduced With Amendments

Senator Fess, of Ohio, on April 26 introduced in the Senate as S. 668 his railroad consolidation bill, as reported by the Senate committee on interstate commerce near the close of the last session of Congress, but with two important changes. Senator Fess does not expect to press the bill at the special session, believing that the special session should be confined to farm relief and tariff legislation; but he has introduced the bill to give it a status for consideration and discussion, particularly if the present legislative program should become broadened.

The changes in the bill result from the omission of the provision which has caused a great deal of debate by which the Interstate Commerce Commission, after finding a proposed unification to be in the public interest, might authorize one of the petitioning carriers to acquire by condemnation the properties, rights and franchises of a carrier that it had decided should be made a party and which, in its opinion, demanded unreasonable terms. The new bill also omits the language in the section added by Senator Sackett at the last session which would direct the commission to prepare a tentative plan, that "no order of the commission approving a plan of unification shall be entered prior to the completion of such plan or plans."

New York-New Jersey Railway Bridge Proposed

The Baltimore & Ohio is acting with the North River Bridge Company in an application to the Secretary of War for approval of plans to build a railway and

highway bridge from New York to New Jersey across the Hudson river at 57th street, New York City. It is expected that the bridge would afford for trains of the Baltimore & Ohio and other railroads now terminating on the Jersey side direct rail access to Manhattan.

The plans, submitted to the Secretary of War, propose a two-deck structure, the upper deck to carry vehicular traffic, including trolleys, and the lower deck to carry 12 railway tracks. It is further proposed to build a union passenger terminal at the Manhattan end of the bridge to accommodate passengers of all New Jersey roads who might use the facilities.

The estimated cost of the bridge and its approaches as submitted with the plans would reach \$180,000,000. The plans further provide that railroad tracks, after leaving the bridge, would descend into a subway and remain under ground throughout the loop over which the trains would return after passing from the station. On the New Jersey side the through tracks would be diverted to a belt line connecting the railroads. It is also contemplated that the bridge tracks may be connected with any system of freight terminal facilities which may later be developed on Manhattan.

Secretary of War Good stated on May 2 that General Edgar Jadwin, chief of engineers is expected to report shortly on examination of the general plans.

Novel Crossing Signal

The highway crossing signal illustrated is one situated near the entrance to the Champlain Bridge, Hull, Quebec, on the highway leading to Ottawa. The diagonal board fixed on the post below the sign is 4 ft. long and 18 in. wide, and the white portion, on the approach of a train, gives an electric effect which has somewhat the appearance of a streak



Crossing Near Hull, Que.

of lightning—though the light given out is red, not white or yellow. On the top of the post there is an audible signal (not shown in the picture) which is described as a siren, the location of the crossing being considered a specially dangerous one.

The tracks at this point are those of the

Canadian Pacific Railway and the Hull Electric Railways. It will be noted that on the farther side of the tracks there is a similar sign, for the benefit of wayfarers coming from the bridge.

Burlington to Plant Trees

The C. B. & Q. has adopted a tree-planting program whereby 40,000 trees will be planted annually along the railroad west of the Missouri river. They will be planted in three rows on each side of the tracks, the first row from the rails to be Caragana or China pea trees, the second row to be Russian olives and the third American elms. In some sections box elder and honey locust will alternate, and in still other districts South Austrian and jack pine will be used. The trees will be planted according to soil and climatic conditions.

These plantings will be made for the most part in Western Nebraska and Eastern Colorado. Some of this territory is comparatively treeless the proper varieties of trees for these particular regions having not yet been established. The trees to be planted have been demonstrated as especially adapted to the prevailing climatic conditions of this territory through experiments at state and federal experiment stations located in these communities.

The planting plan is in line with the movement among citizens to increase the number of trees in each locality. The plants, however, will serve a dual purpose for in addition to beautifying the landscape they will provide natural hedges for the protection of the road from drifting snow. The trees are being planted under the direction of the federal and state forestry officers, in cooperation with the railroad.

Last season the company planted about 7,000 trees in an initial experiment and 80 per cent of them lived. The balance were destroyed by jackrabbits and grasshoppers.

Meetings and Conventions

The following list gives names of secretaries, date of next or regular meetings and places of meetings.

AIR BRAKE ASSOCIATION.—T. L. Burton, Room 5605, Grand Central Terminal Building, New York City. Exhibit by Air Brake Appliance Association.

AIR BRAKE APPLIANCE ASSOCIATION.—Fred Venton, Crane Company, 836 So. Michigan Blvd., Chicago. Meets with Air Brake Association.

AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS.—J. D. Gowin, 112 W. Adams St., Chicago.

AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.—E. L. Duncan, 332 S. Michigan Ave., Chicago. Next meeting, June 25, 1929, Troutdale Inn, Denver, Col.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—J. Rothschild, Room 400, Union Station, St. Louis, Mo. Next annual convention, June 4-7, 1929, St. Regas Hotel, Mexico City.

AMERICAN ASSOCIATION OF SUPERINTENDENTS OF DINING CARS.—F. R. Borger, Supt. Dining Car Service, Monon Route, Chicago. Next meeting, October 8-10, Mount Royal Hotel, Montreal, Canada.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—J. W. Welsh, 292 Madison Ave., New York. Annual convention, September 28-October 4, 1929, Atlantic City, N. J.

AMERICAN RAILROAD MASTER TINNERS' COPPER SMITHS' AND PIPE FITTERS' ASSOCIATION.—C. Borchert, 202 North Hamlin Ave., Chicago.

AMERICAN RAILWAY ASSOCIATION.—H. J. Forster, 30 Vesey St., New York, N. Y. Division I.—Operating. J. C. Caviston, 30 Vesey St., New York, N. Y. Freight Station Section—R. O. Wells, Freight Agent, Illinois Central Railroad, Chicago.

Medical and Surgical Section—J. C. Caviston, 30 Vesey St., New York. Protective Section—J. C. Caviston, 30 Vesey St., New York. Safety Section—J. C. Caviston, 30 Vesey St., New York.

Telegraph and Telephone Section—W. A. Fairbanks, 30 Vesey St., New York. Next convention, Sept. 10-12, 1929, Hotel St. Paul, St. Paul, Minn.

Division II.—Transportation—G. W. Covert, 431 South Dearborn St., Chicago. Next meeting, May 28-29, 1929, Stevens Hotel, Chicago.

Division III.—Traffic—J. Gottschalk, 143 Liberty St., New York.

Division IV.—Engineering—E. H. Fritch, 431 South Dearborn St., Chicago, Ill. Exhibit by National Railway Appliances Association.

Construction and Maintenance Section—E. H. Fritch.

Electrical Section—E. H. Fritch. Signal Section—H. S. Balliet, 30 Vesey St., New York. Stated meeting, September 10-12, 1929, Atlanta Biltmore Hotel, Atlanta, Ga.

Division V.—Mechanical—V. R. Hawthorne, 431 South Dearborn St., Chicago. Ill. Annual meeting, June 25-28, 1929, Alexandria Hotel, Los Angeles, Cal.

Equipment Painting Section—V. R. Hawthorne, 431 South Dearborn St., Chicago. Annual meeting, September 10-12, 1929, Muehlbach Hotel, Kansas City, Mo. Exhibit by Supply Men's Association.

Division VI.—Purchases and Stores—W. J. Farrell, 30 Vesey St., New York, N. Y. Annual meeting, June 24-26, 1929, Palace Hotel, San Francisco.

Division VII.—Freight Claims—Lewis Pilcher, 431 South Dearborn St., Chicago. Ill. Annual meeting, May 21-24, 1929, Hotel Willard, Washington, D. C.

Division VIII.—Motor Transport—George M. Campbell, American Railway Association, 30 Vesey St., New York, N. Y. Car Service Division—C. A. Buch, 17th and H. Sts., N. W., Washington, D. C.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichten, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Annual convention, October 15-17, 1929, Roosevelt Hotel, New Orleans, La. Exhibit by Bridge and Building Supply Men's Association.

AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.—E. L. Taylor, Asst. to V. P., N. H. & H., New Haven, Conn. Annual meeting, May 22-24, 1929, Lamar Hotel, Houston, Tex.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—(Works in co-operation with the American Railway Association, Division IV). E. H. Fritch, 431 South Dearborn St., Chicago. Exhibit by National Railway Appliances Association.

AMERICAN RAILWAY MAGAZINE EDITORS' ASSOCIATION.—Miss Page Nelson Price, Norfolk & Western Magazine, Roanoke, Va.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. W. Macina, C. M. St. P. & P. R. R., 11402 Calumet Ave., Chicago. Annual convention, September 11-14, 1929, Hotel Sherman, Chicago. Exhibit by Supply Association of the American Railway Tool Foremen's Association—Secretary: C. C. Ziegler, Greenfield Tap & Die Co., 13 So. Clinton St., Chicago.

AMERICAN SHORT LINE RAILROAD ASSOCIATION.—T. F. Whittelsey, Union Trust Bldg., Washington, D. C.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Railroad Division, Marion B. Richardson, 30 Church St., New York.

AMERICAN WOOD PRESERVES' ASSOCIATION.—H. L. Dawson, 228 N. La Salle St., Chicago. Annual convention, January 28-30, 1930, Seattle, Wash.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, District Claim Agent, Northern Pacific Ry., St. Paul, Minn. Next meeting, June 19-21, 1929, Statler Hotel, Detroit, Mich.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucci, C. & N. W., Room 413 C. & N. W. Station, Chicago. Annual meeting, October 22-25, 1929, Hotel Sherman, Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.

ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, 17th & H. Sts., N. W., Washington, D. C.

ASSOCIATION OF RAILWAY SUPPLY MEN.—E. H. Weaver, Westinghouse Air Brake Co., 80 E. Jackson Blvd., Chicago. Meets with International Railway General Foremen's Association.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—Annual exhibit at convention of American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—C. R. Crook, 129 Charon St., Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, Chicago & Alton, Chicago. Regular meetings, 2nd Monday in month, except June, July and August, Great Northern Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF LOS ANGELES.—J. W. Krause, 514 East Eighth St., Los Angeles, Calif. Regular meetings, second Friday of each month, 514 East Eighth St., Los Angeles.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—F. G. Wiegmann, 720 N. 23rd St., East St. Louis, Ill. Meetings first Tuesday of each month, except July and August, Broadview Hotel, East St. Louis, Ill.

CENTRAL RAILWAY CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 2nd Thursday each month, except June, July, August, Hotel Statler, Buffalo, N. Y.

CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S ASSOCIATION.—(See Master Car Builders' and Supervisors' Association.)

CINCINNATI RAILWAY CLUB.—D. R. Boyd, 811 Union Central Bldg., Cincinnati, Ohio. Meetings, 2nd Tuesday in February, May, September and November.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Alder Ave., Cleveland, Ohio. Meetings, first Monday each month, except July, August, September, Hotel Hollenden, Cleveland.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich. Next meeting, August 20-22, 1929, Fort Shelby Hotel, Detroit, Mich. Exhibit by International Railroad Master Blacksmith's Supply Men's Association.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' SUPPLY MEN'S ASSOCIATION.—W. A. Champeaux, Oxfeld Railroad Service Co., 80 E. Jackson Blvd., Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—L. G. Plant, 80 E. Jackson Blvd., Chicago. Next meeting, May 7-10, 1929, Hotel Sherman, Chicago. Exhibit by International Railway Supply Men's Association.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabasha St., Winona, Minn. Annual convention, September 17-20, Chicago.

INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—S. A. Witt, Detroit Lubricator Co., 820 S. Michigan Blvd., Chicago. Meets with International Railway Fuel Association.

MASTER BOILER MAKER'S ASSOCIATION.—Harry D. Vought, 26 Cortlandt St., New York. Annual meeting, May 21-24, 1929, Hotel Biltmore, Atlanta, Ga.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—A. S. Sternberg, Belt Ry. of Chicago, Polk and Dearborn Sts., Chicago. Annual convention, September 4-6, Hotel Sherman, Chicago.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS.—Roy M. Edmonds, 1252 Syndicate Trust Bldg., St. Louis, Mo.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.—James B. Walker, 270 Madison Ave., New York. Next convention, August 27-30, 1929, Glacier National Park, Mont.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 1014 South Michigan Ave., Chicago. Exhibit at A. R. E. A. convention.

NATIONAL SAFETY COUNCIL.—Steam Railroad Section: A. W. Smallen, C. M. St. P & P., Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings 2nd Tuesday in month, excepting June, July, August and September, Copley Plaza Hotel, Boston, Mass.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 3rd Friday in month, except June, July, and August.

PACIFIC RAILWAY CLUB.—W. S. Wollner, 64 Pine St., San Francisco, Cal. Annual outing, July 11, Travers Island. Regular meetings 2nd Tuesday in month, alternately in San Francisco and Oakland.

RAILWAY ACCOUNTING OFFICERS ASSOCIATION.—E. R. Woodson, 1116 Woodward Building, Washington, D. C.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noyon, 1406 Packard Bldg., Philadelphia, Pa. Annual meeting, November, 1929, Hotel Stevens, Chicago.

RAILWAY CAR DEPARTMENT OFFICERS' ASSOCIATION.—(See Master Car Builders' and Supervisors' Association.)

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 515 Grandview Ave., Pittsburgh, Pa. Regular meetings, 4th Thursday in each month, except June, July and August, Fort Pitt Hotel, Pittsburgh, Pa.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—Edward Wray, 9 S. Clinton St., Chicago. Meets with Association of Railway Electrical Engineers.

RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—F. W. Venton, Crane Co., 836 S. Michigan Ave., Chicago. Meets with Traveling Engineers' Association.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R., Baltimore,

Md. Annual meeting, October 15-17, 1929, Toronto, Canada.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa. Meets with Mechanical Division and Purchases and Stores Division, American Railway Association, June 24-28, 1930. (No exhibit at 1929 meeting.)

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A., Division I.

RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, 1217 Commercial Trust Bldg., Philadelphia, Pa. Annual meeting, September 18-20, 1929, Royal York Hotel, Toronto, Ont., Canada.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—T. F. Donahoe, Gen. Supvr. Road, Baltimore & Ohio, Pittsburgh, Pa. Exhibit by Track Supply Association. Next convention, Sept. 19-21, 1929, Stevens Hotel, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings 2nd Friday in month, except June, July and August.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, West Nyack (Rockland Co.), N. Y. Meets with A. R. A. Signal Section.

SOUTHEASTERN CARMEN'S INTERCHANGE ASSOCIATION.—Clyde Kimball, Inman Shops, Atlanta, Ga. Meets semi-annually.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings, 3rd Thursday in January, March, May, June, September and November, Ansley Hotel, Atlanta.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—R. G. Parks, A. B. & A. Ry., Atlanta, Ga.

SUPPLY MEN'S ASSOCIATION.—E. H. Hancock, (Treasurer), Louisville Varnish Co., Louisville, Ky. Meets with A. R. A. Div. V. Equipment Painting Section.

TRACK SUPPLY ASSOCIATION.—L. C. Ryan, Oxweld Railroad Service Co., 80 E. Jackson Blvd., Chicago. Meets with Roadmasters' and Maintenance of Way Association.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, Gen. Supt., R. S., New York Central, Buffalo, N. Y. Annual meeting, September 24-28, 1929, Hotel Sherman, Chicago. Exhibit by Railway Equipment Manufacturers' Association.

WESTERN RAILWAY CLUB.—W. J. Dickinson, 189 West Madison St., Chicago. Annual dinner, May 6, Hotel Sherman, Chicago. Regular meetings, 3rd Monday each month, except June, July and August.

Traffic

Seaboard Southern States Special Serves Seven Southern States. The Southern States Special was formerly the Atlanta Special.

The Delaware & Hudson on May 1 opened a new freight agency in the General Motors Building, Detroit, Mich., to deal with the whole state of Michigan.

The Grand Trunk has opened a ticket office and information bureau in the Wilmoughby Building, Chicago. This office is in addition to the one in the Consolidated Ticket office and replaces the office at 112 W. Adams street.

The Interstate Commerce Commission has postponed from May 1 to May 15 the effective date of its order reducing the refrigeration charges on fruits, vegetables, berries and melons from the South. The railroads had applied to the United States district court for an injunction.

The Public Utility Commissioners of New Jersey have granted the application of the Pennsylvania to make the stations of the company at Pine Beach and Ocean Gate summer stations; that is to say, regular agencies must be maintained from June 1 to September 30 in the case of Pine Beach and from May 1 to September 30 in the case of Ocean Gate; during the rest of the year these will be non-agency stations.

The Interstate Commerce Commission has suspended from May 15 until December 15, the operation of schedules published in tariffs of the Pennsylvania and the Pittsburgh & Lake Erie, which propose to establish a commodity rate of \$1.02 per ton of 2000 lb. on bituminous coal, from Conway and Colona, Pa., to Youngstown, Ohio, when such coal reaches Conway or Colona via barge lines on the Ohio River, plus charges for transfer from barges to cars.

The Erie announces that beginning June 2, it will put on the "Erie Limited," an express train to run between New York and Chicago in 25 hours. This

train, westbound, will leave New York in the morning and will take the place of the Southern Tier Express which goes no farther than Jamestown and Buffalo. The present Chicago express, leaving New York at 2:45 p.m., runs through in about 28 hours, the standard schedule. On the new train no extra fare will be charged west of Paterson, N. J., 17 miles from New York.

The Public Service Commission of New York has authorized the Delaware & Hudson to discontinue certain trains on its line from Mechanicville, N. Y. through Schenectady to Delanson, 32 miles. The road had been trying for two years to get the Commission to allow reductions in the passenger train service on this unprofitable line. The Commission finds that at present the operation of the line is being conducted at a loss of \$37,500 yearly.

The Wheeling & Lake Erie has filed with the Interstate Commerce Commission a petition similar to those filed by the Eastern Ohio Coal Operators' Association and the Western Pennsylvania Coal Traffic Bureau, asking the commission to re-open the lake cargo coal rate case. The Chesapeake & Ohio and the Louisville & Nashville have asked the commission to dismiss the petitions. The C. & O. urges the commission to take this occasion to declare that at least under the conditions that now exist the controversy should be brought to a close and the industry as a whole be given the benefit of stabilized conditions. The southern coal operators and the Norfolk and Western also have filed replies to the petitions filed by the northern operators and the Wheeling & Lake Erie, asking the commission not to re-open the case.

The New York, New Haven & Hartford announces that arrangements have been made with the Fish Distributing Company, a subsidiary of the United States Trucking Corporation, for the maintenance of a transfer station for

fresh fish at Providence, R. I.; this to facilitate rapid movement of fish from Hyannis, Mass., Newport, R. I., and other southeastern points to New York City. The special fish freight train of this road, leaving Boston and Providence in the evening, delivers fish in New York City at 3 a.m. Transportation of fish from the points named to Providence by motor truck will make a considerable saving in time as compared with transportation by way of Boston which has been the course heretofore.

Freights Faster

The Pennsylvania and the Erie announce that through freight trains from the west are to be made faster, so that fruit, vegetables and dairy shipments can be delivered in New York twenty-four hours earlier than heretofore. The announcements promise third morning delivery on shipments from Chicago and St. Louis, which evidently means a through speed of about 20 miles an hour. The Erie announces that its perishable freight train, No. 98, operated in connection with the Wabash and the Nickel Plate will deliver freight in New York City from Brawley, Calif., on the ninth morning.

The trunk lines between New York and Chicago have announced that west-bound freight from New York is now delivered in Chicago on the third morning after its receipt. Freight trains leave New York at 9 p.m., and later and are run through to Chicago in about 20 hours, thus allowing ample time for making up trains at the point of origin and for placing the cars for unloading at Chicago.

Great Northern's New Train to Coast

The Great Northern, on June 10, will place a new train, the "Empire Builder," in service between Chicago and the Pacific Northwest, on a schedule five hours shorter than the present fastest one. The train, named in honor of James J. Hill, who built the Great Northern, will be a companion to the Oriental Limited and neither will be an extra fare train. The new service will require eight complete new trains. The equipment of each train will include a sun-parlor observation car, Pullman cars with larger dressing rooms, and dining cars with electric refrigeration and electric dishwashing machines. The cars will bear the names of pioneer explorers, soldiers and statesmen, such as John Jacob Astor, John McLaughlin, who built Ft. Vancouver, Alexander Ramsey, Minnesota's early governor, General Phil Sheridan, William Tecumseh Sherman, Nelson A. Miles, George A. Custer, Henry Leavenworth and Wesley Merritt.

The "Empire Builder" will leave Chicago over the Burlington route at 9:15 p.m. and will run through in 63 hours, arriving at Portland at 10 o'clock Pacific time, the third morning. Returning it will leave Portland at 4 p.m. and will arrive in Chicago at 9 o'clock on the third morning.

The Glacier Park Limited, between St. Paul and Seattle will be discontinued after June 10.

Freight Commodity Statistics for 1928

The revenue freight originated on Class I railroads in the calendar year 1928 amounted to 1,282,229,213 tons, a decrease of only .01 per cent as compared with 1927 according to the Interstate Commerce Commission's summary of freight commodity statistics for the fourth quarter and the year. Products of agriculture showed an increase of 4.02 per cent and manufactures and miscellaneous an increase of 6.46 per cent, while the other classifications showed reductions. For the fourth quarter of the year the tonnage originated amounted to 346,476,392, an increase of 10.86 per cent as compared with the corresponding quarter of 1927. Manufactures and miscellaneous showed an increase of 14.98 per cent, products of mines an increase of 11.9 per cent, products of agriculture an increase of 9.12 per cent, and products of forests an increase of 3.32 per cent, while animals and products showed a decrease of 3.09 per cent and l.c.l. freight a decrease of 0.94 per cent. The summary for the year follows:

Commodity group	Tons originated, inc. or dec. twelve months ended period in Dec. 1928	Per cent over same
Products of agriculture...	117,933,805	i 4.02
Animals and products...	25,631,434	d 1.45
Products of mines.....	695,179,857	d 2.65
Products of forests.....	96,715,605	d 2.69
Manufactures and miscellaneous.....	309,880,619	i 6.46
All L.C.L. freight.....	36,887,893	d 4.02
Total	1,282,229,213	d .01

Southwest Shippers' Meeting

The next meeting of the Southwest Shippers' Advisory Board will be held in Oklahoma City, Okla., on May 23. The annual convention of the Oklahoma Grain Dealers Association will be held at the same place after the adjournment of the advisory board meeting. The annual meeting of the Oklahoma Retail Coal Merchants' Association will be held on the afternoon of May 24, following the adjournment of the grain dealers' meeting. All of these meetings will be co-ordinated to a considerable extent. The annual banquet of the Oklahoma Grain Dealers' Association will be held on the evening of May 23, in which all who attend the other meetings will be invited to participate.

Addresses will be made to the grain dealers by H. R. Safford, executive vice-president of the Missouri Pacific, on the subject, "General Business Economics"; by H. G. Taylor, manager of public relations of the Car Service division of the American Railway Association, on the subject, "Co-ordination and Co-operation of the Railroads with the Grain Trade"; and by J. F. Jarrell, manager of the agricultural department of the Atchison, Topeka & Santa Fe, on the subject, "Handling Combine Wheat from a Railroad Standpoint." Frank Winters, president of the Winters Grain Company of Oklahoma City, will address the advisory board on the subject of, "Co-ordination and Co-operation of the Grain Dealers with the Railroads".

Congressional Rate-Making Opposed

Resolutions opposing the idea of Congressional rate-making and setting forth the principles which should govern the administration of the provisions of the Hoch-Smith resolution were approved for consideration by the Chamber of Commerce of the United States at a round-table conference held in connection with the annual meeting of the chamber at Washington on April 30. The conference also approved the report submitted by the committee on railroads, which recommended that, if the resolution should be construed as Congressional rate-making, and therefore contrary to the principles set forth in the report, it should be repealed.

The resolutions expressed the opinion that "the purpose of any general readjustment of rates that may be made, and of all regulation of rates, should be to distribute transportation costs equitably between all industries and territories and to assure the provision of adequate transportation, and that in no other way can the government's power of rate regulation be so exercised as to promote the national welfare." An abstract of the committee's report and the text of its proposed resolutions was published in the *Railway Age* of April 6, page 779. Fred W. Sargent, president of the Chicago & Northwestern, and chairman of the transportation and communication department committee, presided over the conference, which brought out a general discussion of various phases of governmental influence on transportation. A resolution was also adopted favoring reference of the Pullman surcharge question to the Interstate Commerce Commission.

Mediterranean Fruit Fly Quarantine Issued

The Secretary of Agriculture on April 26 issued a quarantine to prevent the spread of the recently discovered Mediterranean fruit fly infestation in Florida. The regulations bring under restriction the State of Florida as a whole, as to all fruits and a limited number of vegetables, but most of the fruit and practically all of the vegetables will be permitted to move out of the state under what are believed to be adequate safeguards.

The regulations have been discussed with and amended to meet reasonable suggestions of the Florida State Plant Board; also of leading growers and the principal common carriers. Pending action by the State Plant Board the restrictions under this quarantine became immediately effective as to the areas designated as infested in the quarantine promulgated on April 15 by that board, and to such additional infested points as have been later determined and are being controlled by the Board. Except as to this provision, the effective date of the quarantine is May 1.

The quarantine names three types of zones; (1) the infested zones, (2) the protective zones and (3) the state as a whole outside of these two. Within all infested zones all fruits and vegetables

are to be destroyed or processed and no more are to be permitted to develop until the zone is released from restriction.

For the present spring shipping season shipments of citrus fruit will not be allowed to be moved from the protective zone after May 31 nor from the rest of the state after June 15. The green citrus fruit of the new crop will be permitted to develop on the trees throughout the summer period but is not expected to reach a stage of development susceptible to fruit fly attack until late fall. This new crop will then be marketed under adequate precautions during the winter months.

All areas in the state outside of these two types of zones will be under restriction merely to the extent of providing for inspection and certification of fruits, and such control of host vegetable crops as may be necessary to fully determine that the fly has not spread to them. All classes of fruits, except watermelons and pineapples, which latter are not known to be subject to attack, are under these restrictions. The restrictions on vegetables relate only to peppers, beans, tomatoes, squashes, gourds and eggplants.

In addition to covering fruits and vegetables, the federal quarantine includes special restrictions on the movement of soil, earth, peat, compost and manure, fruit-packing equipment, and nursery stock. It is further provided that railway cars, boats and other vehicles and containers which have been used in transporting restricted articles must be thoroughly cleaned at the point of unloading and fumigation may also be required in special cases when necessary.

Pennsylvania Establishes Rainbow Between Chicago and New York

The Pennsylvania, on April 28, established the Rainbow, a new train which operates between Chicago and New York on a schedule of 20 hours and 50 minutes. The train was dedicated to the Kainbow (Forty-second) division of the A. E. F. just prior to its departure from Chicago on its inaugural trip. The train leaves Chicago at 3 p. m. and arrives in New York at 12:50 p. m. the following day. A new train leaves Detroit at 6:50 p. m. to connect with the Rainbow at Mansfield, Ohio.

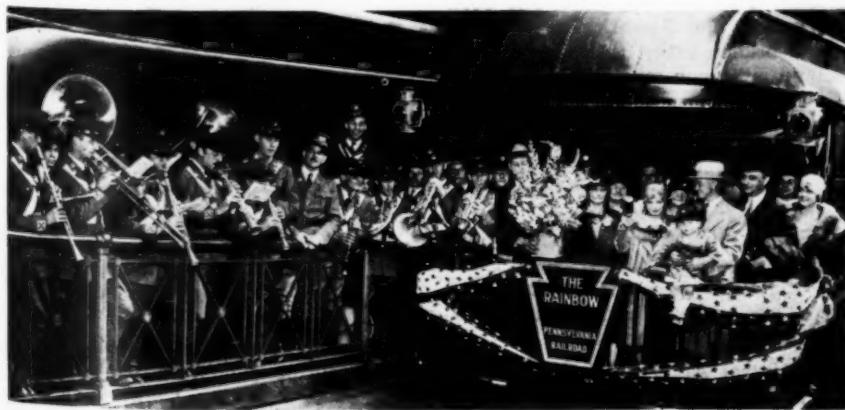
On the same date the Red Knight, another new train, was established between New York and Chicago. This train leaves New York at 10:45 p. m. and arrives in Chicago at 7:35 p. m. the next day.

The Spirit of St. Louis, named for Col. Charles A. Lindbergh's famous plane and christened by the aviator's mother, Mrs. Charles L. Lindbergh, in June, 1927, cut its schedule approximately one hour. The new schedule puts the Spirit of St. Louis on 24-hr. running time, between St. Louis and New York, the exact time eastbound being 23 hours, 53 minutes, while the westbound run is made in 24 hours, 5 minutes. Placing The Spirit of St. Louis on the new schedule puts two Pennsylvania flyers on 24-hr. running schedule, since The American, another limited between St. Louis and Washington and New York, was already on a 24-hr. basis.

Shortened schedules between several other western points and the Atlantic seaboard speed up the traveling time between Cincinnati and the east, in particular. The Cincinnati Limited, which left Cincinnati at 4:20 p. m., departs one hour and 50 minutes later and shortens the running time to New York by 55 minutes giving the Cincinnati Flyer an arrival-time of 9:25 o'clock the next morning. Forty minutes are also cut from the westbound time, the train leaving New York at 4:05 p. m., as previously and reaching Cincinnati at 9:15 a.m.

New service from the south provides passengers from Birmingham, Ala., and intermediate points, with nearly five hours earlier arrival in New York than heretofore. A new through sleeping car leaves Birmingham over the L. & N. at 11:45 p.m. on its train No. 8. This train has been speeded up to make connection with the Cincinnati Limited, departing over the Pennsylvania from Cincinnati at 4:20 p.m. and providing arrival in New York at 9:25 the following morning.

Faster service from Louisville to the east, connecting with the Pennsylvania at Cincinnati, is also provided over the L. & N., which changed its train No. 6 to depart from Louisville at 1:15 p.m., in order to connect with Pennsylvania No. 220 at Cincinnati, which departs 15 minutes later, at 6:15 p.m., and still connects with No. 20 at Columbus.



Wife of Long Island Brakeman, Who Chose Name, Christens Train

Equipment and Supplies

Freight Cars

THE ERIE is inquiring for 25 caboose cars.

THE NORTHERN PACIFIC is inquiring for 100 stock car underframes.

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for 500 all-steel automobile box cars of 50 tons' capacity.

THE NORTHWESTERN REFRIGERATOR Company is inquiring for 650 refrigerator cars of 40 tons' capacity.

THE SOUTHERN PACIFIC has ordered 65 gondola cars from its own shops. Inquiry for this equipment was reported in the *Railway Age* of March 2.

THE EASTERN MICHIGAN has ordered one 50-ft. steel underframe flat car of 40 tons' capacity from the American Car & Foundry Company.

THE BANGOR & AROOSTOOK has ordered two steel underframes for caboose cars from the American Car & Foundry Company.

THE UNION PACIFIC has ordered, through the Rodger Ballast Car Company, one 32-ft. steel underframe double plow car, with 30-ton trucks, to be built by the American Car & Foundry Company.

THE PACIFIC FRUIT EXPRESS has ordered 600 steel underframes for refrigerator cars from the Pacific Car & Foundry Company. Inquiry for this equipment was reported in the *Railway Age* of March 30.

THE BUREAU OF SUPPLIES AND ACCOUNTS, Navy Department, has ordered one hopper coal car body of 50 tons' capacity from the Mt. Vernon Car Manufacturing Company. Inquiry for this equipment was reported in the *Railway Age* of March 30.

Passenger Cars

HOCKING VALLEY—See Chesapeake & Ohio.

THE CHESAPEAKE & OHIO is inquiring for two club-dining cars for service on the Hocking Valley.

THE NEW YORK CENTRAL has ordered 10 multiple unit suburban passenger car bodies from the Standard Steel Car Company.

THE NEW YORK, NEW HAVEN & HARTFORD is inquiring for six dining cars. In the *Railway Age* of March 16, it was reported that this company contemplated buying this equipment.

THE MANILA RAILROAD has ordered 20 third class passenger coaches 65 ft. long from the American Car & Foundry Company. Inquiry for this equipment was reported in the *Railway Age* of April 20.

THE CHICAGO & NORTHWESTERN has ordered 24 suburban coaches from the Standard Steel Car Company. Inquiry for this equipment was reported in the *Railway Age* of March 30.

Machinery and Tools

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered one double axle lathe from Manning, Maxwell & Moore, Inc.

THE FLORIDA EAST COAST has ordered one car axle burnishing lathe from Manning, Maxwell & Moore, Inc.

THE MISSOURI PACIFIC has ordered one ten-ton 40-ft. span crane from Manning, Maxwell & Moore, Inc.

THE CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC has ordered one heavy frog and switch planer from Manning, Maxwell & Moore, Inc.

THE SOUTHERN PACIFIC has ordered a 40-ton 8-wheel steam-driven locomotive crane from the Orton Crane & Shovel Company.

THE CHESAPEAKE & OHIO is inquiring for four 14-inch. geared-head engine lathes; three 18-in., one 20-in., one 30-in. and two 36-in. engine lathes; and one 24-in., one 42-in., two 36-in. and one 54-in. vertical turret lathes.

Iron and Steel

THE WABASH is inquiring for 1,500 tons of structural steel for a bridge at Danville, Ill.

THE WABASH has ordered 500 tons of structural steel for an office building at Detroit, Mich., from the Whitehead and Kales Company.

THE NEW YORK CHICAGO & ST. LOUIS has ordered 200 tons of structural steel for a warehouse at Cleveland, Ohio, from the Massillon Bridge & Structural Company.

THE BALTIMORE & OHIO has ordered from the Mt. Vernon Bridge Company, 1000 tons of steel for a bridge at Baltimore, Md. An order was also given to the Fort Bridge Works for 400 tons of steel for a bridge at Fairport, Ohio.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 400 tons of structural steel for a repair shop at El Reno, Okla. from the Virginia Bridge & Iron Company, and 130 tons for miscellaneous bridge work from the American Bridge Company.

THE PENNSYLVANIA has ordered 6000 tons of steel from the Bethlehem Steel Company for catenary work in connection with its electrification program from Trenton, N. J., to Philadelphia, Pa. An

order has also been given to the American Bridge Company for 500 tons of steel for a bridge at Columbus, Ind.

Signaling

THE TEXAS & PACIFIC has ordered from the General Railway Signal Company material for the installation of automatic block signals on its line between Toyah, Tex., and Sierra Blanca, 102 miles. Color-light signals will be used.

THE DENVER & RIO GRANDE WESTERN has ordered from the General Railway Signal Company material for the installation of automatic block signals on its line between Swallows, Col., and Flor-

ence, 26 miles. Color-light signals will be used.

THE CHESAPEAKE & OHIO has contracted with the Union Switch & Signal Company for the installation of electro-pneumatic car retarders at the new westbound hump yard at Russell, Ky.; 21 retarders, 25 switches and 21 skates.

THE BALTIMORE & OHIO has ordered from the Union Switch & Signal Company material for an electric interlocking at Sixteenth street drawbridge, Chicago; a 47-lever machine with 19 switch and lock movements, 8 color-position-light signals, 13 color-light signals and other material.

Supply Trade

Poor & Company, Chicago, has purchased the Rail Joint Company, New York.

William Robertson & Company, Chicago, has moved its offices to room 630, 360 North Michigan avenue.

The Pullman Car & Manufacturing Corporation has moved its offices from 25 Broadway to 52 Vanderbilt avenue, New York City.

The Hopkins Company, Chicago, has been appointed sales agent for the R. C. Uptegraff Manufacturing Company, Pittsburgh, Pa.

The General Railway Signal Company has moved its New York office from 100 East Forty-second street to 230 Park avenue.

The Johns-Manville Corporation, New York, has moved its western division headquarters from South Michigan avenue and Eighteenth street to 230 North Michigan avenue, Chicago.

Carpenter & Byrne, 4 Smithfield street, Pittsburgh, Pa., have been appointed sales representatives in the Pittsburgh district, for the Pennsylvania Pump and Compressor Company, Easton, Pa.

R. A. Becker, for three years in the credit department of the Truscon Steel Company, Youngstown, Ohio, has been transferred to the Newark, N. J. branch office as branch credit manager. C. D. Loveland is branch manager at Newark.

The Industrial Brownhoist Corporation, Cleveland, Ohio, has purchased the McMyler Interstate Company, Bedford, Ohio. The McMyler plant, machinery and materials are not included in the purchase, but manufacturing operations and the business of the McMyler Company, together with all drawings and records, are to be moved to the Cleveland plant of the corporation.

The Central Alloy Steel Corporation, Massillon, Ohio, has installed a large nitriding furnace at its Canton plant.

The equipment will be utilized as a service to promote the use of nitrailloy. This metal is case-hardened by the nitriding process after it has been made into a finished part. The company plans to place the facilities of the new nitriding furnace at the disposal of manufacturers who, at present, lack such equipment.

The Southern Wheel Company has moved its headquarters from the Grand Central Terminal building, to 230 Park Avenue, New York City; S. C. Watkins, formerly special representative, has been elected vice-president and retains his office at 818 Munsey building, Washington, D. C.; S. F. Pryor, Jr., formerly representative, has been elected vice-president with headquarters at the general offices, New York, and H. S. Russell, formerly representative has been appointed district sales manager with office at 1414 McCormick building, Chicago.

The Oxweld Railroad Service Company has organized a new department for the sale of special equipment to rail-



J. J. Saelens

roads, including the Oxweld railroad lamps, formerly sold by the Union Carbide Sales Company, Carbic flood lights and generators, Prest-O-Lite motor car

head lights, and other equipment of similar nature. In addition, this department will handle all supplies for use with these products. **J. J. Saelens**, formerly of the Union Carbide Sales Company, has been appointed manager of this department and will be in charge of the marketing of these products with railroads. He was born in Chicago and received his education in the schools of that city. He entered the Union Carbide Sales Company in 1913 and has served in various capacities. For the past four years he has been devoting all of his time to the railroad lamp department.

Safety Car Heating and Lighting Company

Net earnings of \$1,045,376, after depreciation and taxes, were reported by the Safety Car Heating & Lighting Company for the year ending December 31, 1928, according to the annual report issued on April 24. The foregoing is equivalent to \$10.60 a share on the 98,620 shares of common stock outstanding and compares with a 1927 net of \$1,005,838 or \$10.19 a share. After payment of the regular dividend of \$8 and an extra dividend of \$2 per share, making a total disbursement of \$986,200, or the same as in the previous year, there remained a surplus for the year of \$59,176. This latter compares with a 1927 surplus after dividends of \$19,638. The consolidated balance sheet of the Safety Car Heating & Lighting Company and its subsidiaries as of December 31, 1928 compares with the 1927 statement as follows:

	Assets	1928	1927
Cash	\$373,627	\$970,801	
Loans and notes receivable and accrued interest	1,612,301	1,607,865	
Accounts receivable	813,634	801,960	
Inventories	1,688,427	1,765,044	
Investments	200	1,512	
Real estate, machinery, etc., after depreciation and other charges	10,050,033	9,505,343	
Prepaid expenses	24,174		
Deferred charges	217,155	—	
	14,755,376	14,676,699	
	Liabilities	1928	1927
Accounts payable	200,088	188,771	
Reserves for taxes and contingencies	194,806	186,622	
Capital stock	9,862,000	9,862,000	
Surplus	4,498,482	4,439,306	
	14,755,376	14,676,699	

Trade Publication

ALTERNATING CURRENT ELECTRIC LOCOMOTIVES.—Data covering all alternating current electric locomotives at present in service in the world is contained in a table published as an appendix of a bulletin issued by the Westinghouse Electric & Manufacturing Company. The bulletin has been prepared by J. V. Dobson and F. C. Hanker and is entitled "A History of the Development of the Single-Phase System." The table is similar to that issued by the American Electric Railway Association but is brought up to date; the last A. E. R. A. tables published for general distribution were issued in August, 1925. The entire table is contained on three 8½ by 11 in. pages.

Construction

CANADIAN PACIFIC.—Plans have been announced for the construction of a freight station at Vancouver, B. C., which will involve an expenditure of about \$100,000.

CENTRAL VERMONT.—This road plans to start work immediately on the reconstruction of its Williamstown branch, from Barre to Williamstown, Vt., which was damaged during the flood of November, 1928. The work will be done by the engineering department of the road under the direction of Chief Engineer P. D. Fitzpatrick. It is expected that the work will be completed within a period of about four weeks.

CHICAGO, ROCK ISLAND & PACIFIC.—This company has awarded a contract to the United Engineers & Constructors, Chicago, for the construction of a 79-ft. by 403-ft. shed at El Reno, Okla., to cost \$164,279. A contract has also been awarded to C. S. Lambie, Amarillo, Tex., for the construction of a 24-ft. by 100-ft. one-story brick veneer passenger station at Stinnett, Tex., to cost approximately \$12,000.

CHICAGO, ROCK ISLAND & PACIFIC.—A contract has been let to the S. W. Miller Heating Company, Chicago, for the construction and installation of a pre-steaming system at the Forty-seventh street shops, Chicago, to eliminate all smoke from locomotives standing at the roundhouses at that point. This project will involve the expenditure of about \$125,000. A contract for the construction of a brick veneer combination freight and passenger station at Stinnett, Tex., has been awarded to C. S. Lambie & Co., Amarillo, Tex., at a cost of about \$30,000. Two new air-lift wells at Hitchland, Tex., and Jo Williams, Okla., will be drilled by D. L. McDonald, Amarillo, Tex., while the installation of the air-lift pumping equipment and construction of pump houses and other necessary facilities will be undertaken by the Railroad Water & Coal Handling Company, Chicago.

ERIE.—This company has awarded a contract to the Staple-Munn-Beals Company, Buffalo, N. Y., for the construction of a lateral highway to eliminate four grade crossings on its lines at Arkport, N. Y.

MOUND CITY & EASTERN.—A contract has been let to Winston Brothers Construction Company, Minneapolis, Minn., for the laying of rail and the construction of bridges and culverts on the line which is under construction between Mound City, S. D., to Leola, 70 miles.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—This road has under consideration plans for the construction of a new station, a 17-story office building and a storage warehouse at Atlanta, Ga. Plans

for the development have been submitted to the Georgia Public Service Commission and definite action is expected within the next few weeks. The cost of the entire project has been estimated at \$3,600,000.

NEW YORK CENTRAL.—A contract has been awarded by this company to H. H. Sherwin & Co., Inc., New York, for the construction of approaches to a bridge on its line at Tremont avenue in New York, at a cost of about \$125,000. Work has been begun on the project.

NEW YORK CENTRAL.—This road has received bids for the elimination of the Odell avenue crossing on its lines at Gray Oaks station, Yonkers, N. Y., estimated to cost about \$140,000. Bids also have been received for the elimination of two grade crossings on its lines in Chappaqua, N. Y., at an estimated cost of \$40,000.

SOUTHERN PACIFIC.—A contract has been let to G. A. Graham & Sons, Dinuba, Cal., for the reconstruction of a concrete and brick passenger and freight station at Delano, Cal., which was recently destroyed by fire. The cost of this reconstruction is estimated at \$30,000.

ST. LOUIS-SAN FRANCISCO.—Plans have been prepared for the construction of a reinforced concrete overhead crossing at Webster Groves, Mo., to cost \$18,000. The railroad and the city will share the cost.

ST. LOUIS SOUTHWESTERN.—A contract has been let to the Gay Construction Company, Dallas, Tex., for the construction, in conjunction with the Southern Ice & Utilities Co., of an ice dock at Pine Bluff, Ark., which will have a capacity of 35 cars. The cost of this project will be about \$65,000.

PENNSYLVANIA.—This company has awarded a contract to the Brown-King Construction Company, Philadelphia, Pa., for the construction of masonry for an under grade bridge to eliminate a grade crossing on its line at Mocanaqua, Pa., at an estimated cost of \$50,000. A contract has been let to the Ready Coal & Construction Company, Chicago, for paving and street improvement work at the Forty-third street subway in Chicago, to cost about \$40,000.

TEXAS & PACIFIC.—Following a recent conference between J. L. Lancaster, president of this railroad and members of the city council of Fort Worth, Tex., it was announced that tentative plans are under consideration for the construction at that point of new passenger and freight terminals which it is estimated would require an expenditure of \$8,000,000. The project would involve some elevation of tracks and the city's portion of the total cost would be met by a bond issue of \$2,000,000. It is planned to locate the new

passenger terminal at the south edge of the Fort Worth business district near the proposed freight terminal. Further discussions between railroad officials and the city will be necessary before an agreement is reached for the actual location and construction of the terminals.

New Agreement Submitted by City In N. Y. West Side Plan

A further step has developed in the enlarged plan for improvement of the West Side riverfront of New York with the recent submission of revised tentative plans for the project to the Board of Estimate by its consulting engineer, Arthur S. Tuttle. The revised agreement, as set forth by Mr. Tuttle makes about 20 material changes in the agreement draft placed before the board on Jan. 7, by Patrick E. Crowley, president of the New York Central. Descriptions of structures to be erected by the city are clarified and provision is made for joint construction to permit completion of the city's parts at the city's convenience. The city also asks the right to make changes in its structures, after public hearing, provided railroad facilities were not interrupted or interfered with. The new agreement also stipulates that the railroad complete its grade crossing removals within six years after the plan is approved; that use of steam locomotives north of Seventy-second street be discontinued two years from approval of the agreement and operation within street lines to the south of Sixtieth street yard within not more than five years; that construction work be begun at once on the new express motor highway across the Sixtieth street yard and northward to West Seventy-ninth street and that the latter be completed within two years.

Under the agreement, also, the railroad is to bear half the cost of the proposed bridge at West 145th street instead of the entire cost as set forth in the previous agreement. The railroad is to assume the cost of relocation of tracks north of Dyckman street instead of only the cost of changing grade on present location. The city is to control the time and method of building the 145th street bridge, the railroad to do the work as a contractor. Another stipulation is that land to be transferred to the railroad in Manhattanville will be allotted so as not to interfere with the construction of a playground roof over the tracks. The city's share of the cost of the roof over the Manhattanville yards is estimated at \$12,500,000. Full responsibility for operation of the new Harlem river bridge is to be placed upon the railroad, the city receiving the right to require construction of the bridge at any time after 10 years from the date of the agreement. The city's share of the project, since the passing of the amendment to the grade crossing law which reduces the city's share to one per cent, has been estimated at \$49,045,000. The state will pay 49 per cent of the work and the railroad 50 per cent. The entire project has been estimated at more than \$30,000,000. Public hearings on the proposed plan are expected to begin Monday, May 6.

ARKANSAS WESTERN. — *Construction Authorized.*—This company has been authorized by the Interstate Commerce Commission to construct a 23.5 mile extension in Scott county, Ark.

ATLANTIC CITY. — *Bond Maturity Extended.*—This company has been granted authority by the Interstate Commerce Commission to extend from May 1, 1929, to May 1, 1954, the maturity date of \$2,200,000 of its first mortgage bonds. An accompanying order permits the Reading to assume obligation and liability as guarantor for the bonds.

BALTIMORE & OHIO—CHESAPEAKE & OHIO. — *Joint Operation.*—These companies have applied to the Interstate Commerce Commission for a certificate authorizing joint use and double-track operation over the Chesapeake & Hocking and the Toledo & Cincinnati from a point between Richmond and Rittenour and a point west of Vauces, Ohio, 5.97 miles, where the tracks of the two lines are parallel.

BALTIMORE & OHIO. — *Stock.*—The board of directors of this company, subject to the approval of the Interstate Commerce Commission, has authorized the issue of 411,077 additional shares of its common stock and offers to the holders of its preferred and common stock the right to subscribe, on or before June 20, 1929, at \$100 per share (with an adjustment of interest as of dates of payments) for a number of shares of such additional common stock equal to 15 per cent of the number of shares of preferred or common stock of the company registered in their names. The proceeds of this issue, approximately \$41,000,000, will be applied to current requirements and towards an extensive program of additions and betterments, including improvements at several important terminals.

BALTIMORE & OHIO—Clayton Act Hearing.—Hearings in connection with the Interstate Commerce Commission's complaint against this company for violation of the Clayton anti-trust law in acquisition of stock of the Western Maryland in 1927 were begun on April 29 before C. V. Burnside, assistant director of the commission's Bureau of Finance. The Baltimore & Ohio had asked for a stay of the proceedings pending consideration by the commission of its application for approval of the grouping of various eastern lines in its system along the lines of the four-system plan, but this was denied by the commission. At the opening of the hearing the Wabash filed a petition in intervention, stating that it is developing a plan for the establishment of one or more additional independent systems in the territory east of the Mississippi river and taking the position that the Baltimore & Ohio should be required to divest itself of the West-

ern Maryland stock on terms prescribed by the commission to carriers designated by the commission to the end that it may be utilized in the formation of an additional system. It was alleged that the B. & O. had acquired the stock pursuant to agreement with the New York Central and Nickel Plate for the purpose of forestalling the formation of an additional eastern system.

George M. Shriner, senior vice-president of the Baltimore & Ohio, appeared as the first witness and put into the record details regarding the company's acquisition of 42.88 per cent of the Western Maryland stock, at a cost of \$33,090,900. He was cross-examined by W. S. Bronson and C. F. Taplin, of counsel for the Pittsburgh & West Virginia, which also has pending an application for authority to acquire control of the Western Maryland, and by F. C. Nicodemus, Jr., of counsel for the Wabash. In reply to questions as to whether the stock was acquired pursuant to the four-party plan Mr. Shriner said that in addition to its value for other reasons the Baltimore & Ohio considered its value in relation to the consolidation plans. He said he had informed several of the commissioners and Director Mahaffie of the Bureau of Finance shortly after the purchase of the stock. D. G. Gray, vice-president in charge of traffic of the Western Maryland, and O. S. Lewis, freight traffic manager of the Baltimore & Ohio, testified in response to subpoenas issued by the commission and put into the record a large amount of information called for by the commission bearing on the traffic of the two roads. They were cross-examined regarding the extent of the competition. Thomas P. Healey, director of the commission's Bureau of Inquiry, also put into the record extracts from testimony by President Willard of the Baltimore & Ohio, and M. G. Byers, formerly president of the Western Maryland, at the hearings several years ago in connection with the commission's tentative consolidation plan. These witnesses were followed by witnesses for the Business Protective Association, formed by business and professional men in the territory served by the Western Maryland for the purpose of opposing its control by the Baltimore & Ohio and preserving it as a competitor as part of another system. A. E. Beck, traffic consultant, told of a study he had made when he was traffic manager of the Baltimore Association of Commerce which he said showed that the two roads are or ought to be entirely competitive throughout practically the entire length of the Western Maryland and that the shippers of Baltimore would receive better service if the two roads remain competitors. An adjournment was taken to May 27.

BELT RAILWAY OF CHICAGO. — *Trackage Rights.*—This company has been authorized by the Interstate Commerce Com-

mission to operate under trackage rights over approximately 10 miles of line owned by the Baltimore & Ohio Chicago Terminal and the Indiana Harbor Belt in the City of Chicago.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue \$24,000,000 of refunding and improvement mortgage 4½ per cent bonds, which it expects to sell to J. P. Morgan & Co., at a net price of not less than 92 unless the market situation shall substantially change. Of the total \$15,000,000 of the bonds are proposed to be issued in respect of the retirement of a like amount of 6 per cent bonds and the balance to reimburse the treasury.

CHICAGO, ROCK ISLAND & PACIFIC.—*Annual Report.*—The annual report of this company for 1928 shows net income after interest and other charges of \$13,167,696, equivalent to \$12.91 a share on outstanding common stock. This compares with net income in 1927 of \$12,564,830, or \$12.10 a share. Selected items from the income statement follow:

CHICAGO, ROCK ISLAND & PACIFIC			Increase or Decrease
	1928	1927	
Average Mileage operated	8,082.32	8,052.22	30.10
RAILWAY OPERATING REVENUES	141,232,604	140,086,991	1,145,613
Maintenance of way	19,173,524	18,585,993	587,531
Maintenance of Equipment	26,598,095	27,586,675	-988,579
Transportation	50,233,183	50,634,307	-401,124
TOTAL OPERATING EXPENSES	103,266,340	103,333,050	-66,710
NET REVENUE FROM OPERATIONS	37,966,264	36,753,941	1,212,323
Railway tax accruals	8,379,348	7,935,957	443,391
Railway operating income	29,513,204	28,773,936	739,268
Hire of freight cars Cr.	3,926,907	4,104,905	-177,998
Joint facility rents net Dr.	1,324,918	1,202,299	122,619
Total	6,806,473	6,878,965	-72,492
Balance before deduction of interest	24,883,232	24,272,802	610,430
Rent for leased roads—Cr.	156,301	158,057	-1,756
TOTAL INTEREST	11,715,536	11,707,972	7,564
NET INCOME	13,167,696	12,564,830	602,866
Disposition of Net Income			
Dividends on 7 per cent preferred stock	2,059,547	2,059,547	.....
Dividends on 6 per cent preferred stock	1,507,638	1,507,638	.....
Dividends on common stock	4,461,480	3,717,900	743,580
Surplus for year carried to profit and loss	5,139,031	5,279,745	-140,714

DELAWARE & HUDSON.—*Annual Report.*—The annual report of this company for 1928 shows net income after interest and other charges of \$6,358,759, as compared with net income of \$3,037,304 in 1927. Selected items from the income statement follow:

DELAWARE & HUDSON			Increase or Decrease
	1928	1927	
RAILWAY OPERATING REVENUE	40,285,496	42,753,526	-2,468,030
Maintenance of way	4,740,694	5,713,638	-972,944
Maintenance of Equipment	9,388,659	11,284,973	-1,896,314
Transportation	14,713,568	15,024,743	-311,175
TOTAL OPERATING EXPENSES	31,685,731	34,656,101	-2,970,370
Operating ratio	78.65	81.06	2.41
NET REVENUE FROM OPERATIONS	8,599,765	8,097,425	502,340
Railway tax accruals	1,122,128	1,471,158	-349,030
Railway operating income	9,135,808	8,632,323	503,485
Hire of freight cars—Cr.	177,160	130,136	47,024
Joint facility rents	214,202	322,040	-107,838

NET RAILWAY OPERATING INCOME		
	1928	1927
Non-operating income	284,361	287,641
GROSS INCOME	1,584,694	1,555,394
Rent for leased roads	237,550	142,317
Interest on funded debt	370,000	344,167
TOTAL DEDUCTIONS FROM GROSS INCOME	628,167	501,200
NET INCOME	956,527	1,054,194
		-97,667

ILLINOIS CENTRAL.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon operation of a branch line extending from Deer, Tenn., to Tiger Tail, and from Stevens Junction to Mengelwood, and has authorized the Chicago, St. Louis & New Orleans, a non-operating subsidiary of the Illinois Central, to abandon the line.

KINSTON CAROLINA.—*Abandonment.*—The Interstate Commerce Commission has authorized this road to abandon its line between Kinston, N. C., and Beulaville, a distance of 31.086 miles.

MICHIGAN CENTRAL.—*Abandonment.*—This company has been authorized by the Interstate Commerce Commission to abandon 2.65 miles of its Dearborn, Mich., branch.

MICHIGAN CENTRAL.—*Bonds.*—This road has been granted authority by the Interstate Commerce Commission to issue \$7,634,000 of refunding and improvement mortgage bonds to be sold at not less than 96 per cent of par and accrued interest, the proceeds to be used to retire a like amount of outstanding debenture bonds which matured April 1 or to reimburse the treasury for such of the retirements already made.

MINNEAPOLIS & ST. LOUIS.—*Receiver's Certificates.*—This company has been granted authority by the Interstate Commerce Commission to issue \$1,525,000 of receiver's certificates to renew a like amount of certificates maturing during April and May, 1929.

MISSOURI ILLINOIS.—*Acquisition of Control.*—This company has been authorized by the Interstate Commerce Commission to acquire control of the Mississippi River & Bonne Terre by the purchase of capital stock and by lease. An accompanying order permits the acquisition of the Missouri-Illinois by the Missouri Pacific in the former manner.

MISSOURI PACIFIC.—*Acquisition of Control.*—See Missouri-Illinois.

MISSOURI PACIFIC.—*Securities.*—The Interstate Commerce Commission has authorized this road to issue \$46,392,000 of 20-year, 5 per cent, convertible bonds to be sold at not less than 97½ per cent of par, the proceeds to be used to refund maturing obligations, to reimburse the treasury for capital expenditures heretofore made, and to provide funds for proposed additions and betterments. Authority is also granted to issue a like amount of common stock consisting of 463,920 shares of the par value of \$100 a share, the stock to be used solely for

(Continued on page 1081)

Annual Reports

Seventy-Fifth Annual Report of the Chicago, Burlington & Quincy Railroad Company

Chicago, January 2, 1929.

To the Stockholders of the Chicago, Burlington & Quincy Railroad Company:

The following is the report of your Board of Directors for the year ended December 31, 1928:

Comparative Statement of Income, Years Ended December 31

Per cent of Ry. Oper.	RAILWAY OPERATING REVENUES	Per cent of Ry. Oper.
Revenue 1928	1927	Revenue
77.94 \$126,952,879.35	Freight \$118,497,414.02	75.80
12.10 19,715,276.10	Passenger 22,058,572.19	14.11
2.57 4,181,409.98	Mail 3,739,043.90	2.39
2.67 4,348,682.17	Express 4,141,537.08	2.65
2.71 4,413,370.28	All other transportation 4,488,783.87	2.87
1.51 2,471,026.12	Incidental 2,494,883.06	1.60
.50 808,765.34	Joint Facility 900,219.69	.58
100.00 \$162,891,409.34	Total railway operating \$156,320,453.81	100.00
<hr/>		
RAILWAY OPERATING EXPENSES		
15.66 \$ 25,515,421.87	Maintenance of way and structures \$ 23,668,877.97	15.14
16.70 27,197,585.87	Maintenance of equipment 26,486,674.60	16.94
2.01 3,275,344.86	Traffic 3,161,990.50	2.02
32.48 52,922,444.94	Transportation 53,503,271.98	34.23
.92 1,496,193.19	Miscellaneous operations 1,576,228.17	1.02
2.71 4,411,170.29	General 4,407,381.46	2.82
Cr. 38 Cr. 627,002.20	Transportation for investment—Credit 886,921.52	Cr. .57
70.10 \$114,191,158.82	Total railway operating \$111,917,503.16	71.60
29.90 \$ 48,700,250.52	Net revenue from railway operations \$ 44,402,950.65	28.40
..... \$ 11,192,209.54	Railway tax accruals \$ 11,676,577.62	.....
..... 33,783.52	Uncollectible railway revenues 51,393.26	.....
..... \$ 37,474,257.46	Railway operating income \$ 32,674,979.77	.....
..... Dr. 2,467,281.60	Hire of equipment—Net. Dr. 2,364,201.33	.....
..... Dr. 2,094,608.84	Joint facility rents—Net. Dr. 2,167,470.03	.....
..... \$ 32,912,367.02	Net railway operating income \$ 28,143,308.41	.....
<hr/>		
OTHER NON-OPERATING INCOME		
..... \$ 581,139.62	Miscellaneous rent income \$ 612,571.29	.....
..... 2,399,091.22	Dividends and miscellaneous interest 2,212,047.10	.....
..... 57,495.04	Miscellaneous income \$ 57,288.84	.....
..... \$ 3,037,725.88	Total other non-operating income \$ 2,881,907.23	.....
..... \$ 35,950,092.90	Gross income \$ 31,025,215.64	.....
<hr/>		
OTHER DEDUCTIONS FROM GROSS INCOME		
..... \$ 202,383.68	Miscellaneous rents \$ 188,989.28	.....
..... 9,177,555.00	Interest on funded debt 9,126,458.33	.....
..... 146,656.64	Interest on unfunded debt 129,862.53	.....
..... 145,245.65	Amortization of discount on funded debt 135,531.72	.....
.....	Miscellaneous income charges 1,250.00	.....
..... \$ 9,671,840.97	Total other deductions from gross income \$ 9,582,091.86	.....
..... \$ 26,278,251.93	Net income \$ 21,443,123.78	.....
<hr/>		
DISPOSITION OF NET INCOME		
..... \$ 17,083,820.00	Dividends \$ 17,083,815.00	.....
..... \$ 9,194,431.93	Income balance transferred to profit and loss \$ 4,359,308.78	.....
<hr/>		
General Operations		
REVENUES		
Total Operating Revenues for 1928	\$162,891,409	
Total Operating Revenues for 1927	156,320,454	
Increase	\$ 6,570,955	4.20%

The increase was made up as follows:

Freight	Increased \$ 8,455,465	7.14%
Passenger	Decreased 2,343,296	10.62%

Mail	Increased \$ 442,366	11.83%
Express	Increased 207,145	5.00%
Other Transportation Revenues	Decreased 75,414	1.68%
Demurrage	Decreased 16,304	5.32%
Other Incidental Operating Revenues	Decreased 99,007	3.21%
Total increase	\$ 6,570,955	4.20%

FREIGHT:

Freight revenue for the past year was the largest since 1920. An increase of \$8,455,465, or 7.14%, over the previous year was due to an increase of 8.51% in ton miles of revenue freight handled. Heavier movement of agricultural products in bituminous coal and a record movement of manufactured products were the principal reasons for the increase.

A comparison of tonnage with 1927 commodities shows the following:

Products of Agriculture	Increased 776,985 tons	8.85%
Animals and Products	Decreased 31,553 tons	1.16%
Products of Mines	Increased 2,276,359 tons	13.43%
Products of Forests	Decreased 43,024 tons	1.73%
Manufactures and Miscellaneous	Increased 949,088 tons	9.86%
Less-than-carload tonnage	Decreased 101,007 tons	6.24%

Total tonnage Increased 3,826,848 tons 9.07%

A comparison of carloads shows:

Total cars (all commodities) in 1928	1,477,074 cars
Total cars (all commodities) in 1927	1,380,681 cars

Increased in 1928 96,393 cars 6.98%

Another generally favorable crop year in our territory resulted in an increase of 25,751 carloads of grain. Notwithstanding the decrease in the amount of wheat and corn raised in Nebraska during 1928, the number of carloads of all grain originating on our lines west of the Missouri River increased 27.7%. The comparatively light production of corn during 1927 made a demand which resulted in a heavy eastern movement from this territory during 1928. A larger movement of grain from the northwest moving via the Twin City gateway and a greater production of grain other than corn and wheat resulted in an increase of 10% in the movement of grain tonnage in territory east of the Missouri River. A short crop of citrus fruit, the inability of western and northwestern potato growers to develop a market for their product and the lighter movement of cantaloupes through the Kansas City gateway accounts for the decrease of 3,109 cars, or 4.64%, in the total movement of fruits and vegetables.

Animals and products decreased 31,553 tons, or 1.16%. A substantial increase in the movement of hogs was offset by a lighter movement of cattle from the corn belt. The movement of sheep from the Wyoming territory continued to increase. With the exception of a decrease in fresh meats there was little change in the movement of animal products.

The increase of 1,559,082 tons, or 14.41%, shown in the tonnage of bituminous coal as compared with 1927 was due to a six months' suspension in the operation of our mines east of the Missouri River during the earlier year. Of the total bituminous coal handled, 75% originated on the Burlington, and of this 60% went to system points. The average revenue per ton decreased 4c, or 2.4%. A larger movement of other products of mines also contributed to the increase of 2,276,359 tons or 13.43%, in the total tonnage of products of mines.

The tonnage of forest products decreased 1.73%, compared with 1927, this decrease being in shipments from north coast states via Billings and St. Paul. These decreases were approximately offset by increases in southern lumber through the Paducah, St. Louis and Kansas City gateways, where our percentage of increases in carloads handled were 11.7, 8.0 and 16.1 respectively.

The movement of manufactured products increased 949,088 tons, or 9.86%, exceeding the tonnage of any previous year. Practically every commodity classified under this heading showed substantial increases over the previous year. The movement of agricultural implements and sugar, glucose, etc., increased 15.11% and 6.69%, respectively, over last year's record tonnage. Other commodities under this heading showing substantial increases over any previous year were furniture, fertilizer and paper.

[ADVERTISEMENT]

PASSENGER:

The continued development of hard roads and consequent increase in the use of private and public automobiles for inter-city travel explains the decrease in passenger revenue. We carried 1,252,994 fewer revenue passengers than during the previous year, a decrease of 8.27%. The decrease in passenger miles was 80,630,381, or 9.93%, the average haul per passenger increasing 6.2 miles over 1927. The constant increase in the average haul indicates that the decrease in our passenger business continues to be largely in the short haul traffic. The tendency to reduce passenger fares for various occasions and special parties to meet bus competition and the fact that our low rate summer tourist traffic is now a larger proportion of the total accounts for the average revenue per passenger mile, decreasing from \$0.02718 in 1927 to \$0.02697 in 1928. Because of the effect of these excursions on regular commercial travel, the operation of excursions between certain points was discontinued. As a result of this curtailment the gross revenue from low rate week-end excursions decreased 6.8% as compared with last year. Our business in Chicago's suburban territory showed a slight decrease, this being attributed to the greater use of private automobiles and busses and to the curtailment of activities of an important manufacturing plant in that territory. The revenue from this traffic, however, increased almost 1%, due to the fact that effective January 1, 1928, the Illinois Commerce Commission granted an increase in commutation rates of 4.3%. The year 1928 was the fourth of the Burlington Escorted Tours Bureau, operated jointly with the Great Northern and Northern Pacific Railway Companies. In 1928 the bureau handled a total of 3,381 passengers, a decrease of 58 passengers or 1.7% below 1927, which was due to decrease in the total business to and from Alaska and to an increase in the number of competitors. With visitors to the Yellowstone National Park the Cody gateway is proving deservedly popular, and there was an increase in the number moving by that route.

Operating Statistics

Tons of revenue freight carried, 1928.....	46,009,515	
Tons of revenue freight carried, 1927.....	42,182,667	
Increase	3,826,848	9.07%
Revenue tons one mile, 1928.....	12,931,723,281	
Revenue tons one mile, 1927.....	11,918,019,045	
Increase	1,013,704,236	8.51%
Revenue tons per train mile, 1928.....	714.67	
Revenue tons per train mile, 1927.....	665.64	
Increase	49.03	7.37%
Revenue tons per loaded car, 1928.....	22.70	
Revenue tons per loaded car, 1927.....	22.46	
Increase .....	.24	1.07%
Average revenue per ton mile (cents), 1928.....	.982	
Average revenue per ton mile (cents), 1927.....	.994	
Decrease .....	.012	1.21%
Average distance hauled per revenue ton (miles), 1928.....	281.07	
Average distance hauled per revenue ton (miles), 1927.....	282.53	
Decrease	1.46	.52%
Revenue passengers carried, 1928.....	13,896,397	
Revenue passengers carried, 1927.....	15,149,391	
Decrease	1,252,994	8.27%
Revenue passengers carried one mile, 1928.....	730,969,834	
Revenue passengers carried one mile, 1927.....	811,600,215	
Decrease	80,630,381	9.93%
Average distance carried revenue passengers, 1928.....	52.60	
Average distance carried revenue passengers, 1927.....	53.57	
Decrease .....	.97	1.81%

Expenditures (Operating)

Total operating expenses, 1928.....	\$114,191,158.82	
Total operating expenses, 1927.....	111,917,503.16	
Increase	\$ 2,273,655.66	2.03%

The increase of \$2,273,655.66, or 2.03%, in operating expenses was the result of various conditions having a direct influence on the three major classes of operating expenses, among the more important of which were the following:

In furtherance of our policy of maintaining our facilities in condition suitable for an improved handling of the increased traffic reflected in an increase in gross revenue of \$0.570,955.53, or 4.20%, heavier maintenance of way expenses were incurred: there being an increase over the preceding year of \$1,846,543.90, or 7.80%, in this item. Approximately one-half of this increase was incurred in making necessary rail replacements, to provide for the use of heavier power, the operation of longer trains, and an increase in train speed. The remainder of the increase was in the minor classes of maintenance work such as ballasting and general track conditioning.

Notwithstanding an increase of 9.70% in tons of revenue freight carried and numerous increases in rates of pay, transportation expenses were reduced \$580,827.04 or 1.09%, under the comparatively low level prevailing in 1927. This decrease was accomplished principally by a continued application of rigid measures of economy in all departments. An increase in general efficiency, resulting in part from the use of improved appliances also contributed to this reduction. Due to the coal miners' strike in 1927, the price of fuel in 1928 was lower than in the previous year. This fact, taken together with an increase in the efficiency of power, contributed to a decrease of \$1,191,812.41, or 11.21%, in the charge for fuel for locomotives.

Maintenance of equipment expenses increased \$710,911.27, or 2.68%, over 1927. This was due principally to a large proportion of our coal carrying equipment coming due for heavy repairs during the year, which fact coupled with the prospect of continued activity in the Illinois coal fields made it advisable to incur expenditures sufficient to bring that class of equipment up to a condition suitable for the prompt and economical handling of that traffic.

Expenditures (Capital)

There were no new lines constructed during the year, capital expenditures having been directed primarily towards increased economy and safety of operation and improvement in service. Total expenditures for 1928 chargeable to Capital Account were as follows:

For Road	\$6,976,214.77
For Equipment	Cr. 2,270,817.32*
For General	Cr. 284,845.97*
Total	\$4,420,551.48

Agricultural

The grain yields throughout our territory, although not exceeding any previous record productions, based on the volume of business handled by our line, were very satisfactory. Wyoming had the best agricultural year in her history. Beet growers in Wyoming, Colorado, Nebraska and Montana received a record payment for their crops. A record crop of beans was harvested in Wyoming. Great Northern variety beans exceeded last year's crop by 35%, the Big Horn Basin producing 320 cars.

Cooperation was given in placing a Wyoming exhibit at the Omaha and Chicago Live Stock Shows, which gained a large amount of publicity for the state, and assistance was given many communities in arranging for advertising campaigns. Settlement was completed on 44 farm units comprising the first section of the Willwood Division of the Shoshone government irrigation project; the second section opened in October with 25 units and ten were taken before the end of the year. A total of 462 cars of emigrants' effects received on Alliance, Casper, McCook, Sheridan and Sterling divisions compared with 417 cars in 1927; 2,500 inquiries for land were developed from a limited amount of classified advertising. A large amount of literature was distributed.

Substantial progress was made in northeast Missouri in furthering the use of agricultural limestone and legumes to build up soil fertility and provide the necessary forage crops in connection with a live stock program in which dairying is now being emphasized; 299 dairy rations were corrected and 43 dairy feeding demonstrations established in 1928. An increase in dairy cattle has been brought about in this section and cooperation given a state-wide dairy movement. A series of poultry schools including culling demonstrations and poultry clinics was held. Attendance at 76 soil improvement meetings totaled 13,320; 1,266 soil tests were made for 512 farmers. A Soil Dividend Special visited 20 towns in October and laid foundation for numerous dairy calf clubs, legume demonstrations, dairy and poultry schools, cow testing associations and agricultural improvement clubs. Each of 88 legume demonstrations visited for the second time showed marked progress; four new demonstrations were established. A total of 167 lime storage bins have now been established in Lines East territory with 29 new bins in 1928. There has been an increase of 163 cars of commercial fertilizer shipped to Missouri points and a gain of 19 cars of lime; also increase of 88 cars of lime to Illinois points. Nineteen carloads of soy beans were shipped from northeast Missouri points which have never originated full carloads of the crop previously. Efforts to stimulate support of county agent work resulted in employment of three new county agents in Missouri.

The Directors express their appreciation of the cooperation and faithful and efficient services rendered by the officers and employees of the Company during the year.

By order of the Board of Directors.

FREDERICK E. WILLIAMSON,
President.

The First Annual Report of the Chicago, Milwaukee, St. Paul and Pacific Railroad Company for the Year Ended December 31, 1928

To the Stockholders of Chicago, Milwaukee, St. Paul and Pacific Railroad Company:

The Board of Directors submits the following report of the operations and affairs of Chicago, Milwaukee, St. Paul and Pacific Railroad Company for the year ended December 31, 1928.

Chicago, Milwaukee, St. Paul and Pacific Railroad Company (a Wisconsin corporation) was organized March 31, 1927, to acquire the property of Chicago, Milwaukee and St. Paul Railway Company, which was sold November 22, 1926, under a final decree of foreclosure. The acquisition of the property under the terms and conditions of the Plan of Reorganization (dated June 1, 1925, as modified, November 19, 1925) was authorized by an order of the Interstate Commerce Commission, dated January 4, 1928, and your Company entered into possession and operation of the property as of midnight January 13, 1928. The Income Account is, therefore, for the period from January 13, 1928 (midnight) to December 31, 1928, and includes only transactions for that period. Charges and credits arising out of transactions which took place prior to January 13, 1928 (midnight), but determined and accounted for subsequent thereto, resulted in a debit of \$2,371,153.06 which, in accordance with the accounting rules of the Interstate Commerce Commission, was not charged against the income of your Company.

Gross operating revenues in 1928 were the highest in the history of the railroad. As compared with 1927, passenger revenues decreased \$1,122,020, and freight revenues increased \$8,421,981. There was a net increase in railway operating revenues of \$7,612,080.

Expenditures for maintenance of way decreased \$541,173; for maintenance of equipment \$5,659,965 (in part due to the fact that charges on account of retirements in 1927 were abnormally high), traffic expenses decreased \$171,801 and transportation expenses decreased \$1,700,222. The total decrease in all railway operating expenses was \$8,265,367.

Railway tax accruals increased \$1,369,927, of which \$936,639 is due to Federal income tax, no such tax having been paid in the previous year.

As a result of the increase in operating revenues and reduction in operating expenses the net railway operating income increased from the 1927 figure of \$14,072,934 to \$29,119,053, or an increase of \$15,046,119. Deducting from this amount the net debit to net railway operating income of \$2,424,924, resulting from charges and credits arising out of transactions which took place prior to January 13, 1928, and for that reason not included in the operating accounts of this company, the net increase was \$12,621,195.

While the 1928 results are very substantially better than those of any previous year since the beginning of Federal control, and so afford ground for encouragement, they still fall far short of what they should be. The rate of return earned on the investment in road and equipment, including material and supplies and cash at the beginning of the year, was but 3.84%, and the rate of return earned on the Interstate Commerce Commission's tentative final valuation (which is regarded by the Company as inadequately low), plus the net of additions and betterments less retirements since valuation date, is but 4.17%.

That the situation confronting this Company in the matter of return earned is not radically different from that which confronts the Western lines as a whole, is shown by the fact that in the year 1928 for the entire Western district the average rate of return earned on the investment in road and equipment, including materials and supplies and cash on hand, January 1st of that year, was 4.36%. For the Northwestern region, the figure was 4.05%. The Interstate Commerce Commission has, under the provisions of The Interstate Commerce Act, fixed 5 1/4% as the fair rate of return. The shortage below such return for the Western district as a whole was \$148,118,000, for the Northwestern region, \$59,707,000, and for this Company, \$14,521,000.

When consideration is given to the fact that these low returns were earned in the year in which the Company's operating revenues were the greatest in its history, that during the year 1928 as a result of proceedings under the Railway Labor Act, increases were made in wages (only partly reflected in 1928 results) aggregating \$1,600,000 on a yearly basis, and that since the first of this year additional wage increases have been made which, on the basis of 1928 pay rolls, would increase the

total wage bill by approximately \$1,000,000, the need for the practice of every operating economy and for a more liberal rate level is apparent. Passenger revenues, as a result of motor vehicle competition, continue to show a declining tendency and apparently the bottom has not yet been reached. The average freight earnings per ton mile in 1928 were 10.37 mills, as compared with 12.66 mills in 1921. This reduction in ton mile earnings of 18% since 1921 reflects the two general rate reductions made by the Interstate Commerce Commission and the cumulative effect of rate reductions, which have been characterized as the whittling process. As a partial offset to this declining tendency the Interstate Commerce Commission, after protracted hearings, increased, by its decision entered in August, 1928, the rates on all railroads for carrying the mails by 15%, and also awarded back pay to May 9, 1925. It is estimated that this increase will amount to \$440,000 annually for this Company and that the portion of the order awarding back pay, which has recently been sustained by the Supreme Court of the United States, will, when Congress makes the necessary appropriation, give this Company about \$1,415,000.

In 1926 the Interstate Commerce Commission had before it an application by the carriers in the Western District for a 5% increase in their freight rates. The Commission denied this application, but pointed out in its decision that the rates in Western Trunk Line territory were relatively low as compared with the surrounding rate groups. Western Trunk Line territory embraces all of our lines, except those in Indiana, Montana, Idaho and Washington. The carriers in this territory filed an application with the Commission to increase the class rates. A large number of hearings were held on this application and the case has now been finally submitted to the Commission for decision.

The operated mileage at the close of the year and the income for the period January 14 to December 31, 1928, inclusive, were as follows:

OPERATED MILEAGE AT CLOSE OF YEAR	
Miles of road	11,251.72
Miles of additional main tracks	1,297.14
Miles of yard tracks and sidings	4,318.85
Total Mileage Operated	16,867.71

CONDENSED INCOME ACCOUNT

JANUARY 14 TO DECEMBER 31, 1928, INCLUSIVE

RAILWAY OPERATING INCOME:	
Railway operating revenues	\$165,303,693.60
Railway operating expenses	120,580,918.39

Net railway operating revenue	\$ 44,722,775.21
Railway tax accruals	9,924,917.38
Uncollectible railway revenues	2,403.13

Railway operating income	\$ 34,795,454.70
Equipment rents—debit balance	3,316,819.66
Joint facility rents—debit balance	2,451,579.83

Net railway operating income	\$ 29,027,055.21
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NON OPERATING INCOME:	
Rents from lease of road	\$ 330,620.07
Rents received—Other	628,382.16
Dividends on stocks	187,264.97
Income from funded securities:	

Interest on bonds and notes	817,002.53
Interest on advances to affiliated companies	9,134.51
Income from unfunded securities and accounts:	

Interest on demand loans, time loans and time deposits	560,318.27
Interest on bank balances	195,962.52
Miscellaneous interest	13,815.92
Miscellaneous income	1,504.89

Net railway and non operating income	\$ 2,744,005.84
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DEDUCTIONS:	
Rents paid—Lease of road	\$ 1,019,953.92
Rents paid—Other	74,056.09
Interest on unfunded debt	79,807.95
Miscellaneous	98,489.12

Net railway and non operating income	\$ 31,771,061.05
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DEDUCTIONS:	
Rents paid—Lease of road	\$ 1,019,953.92
Rents paid—Other	74,056.09
Interest on unfunded debt	79,807.95
Miscellaneous	98,489.12

Net income before deduction for interest on funded debt	\$ 30,498,753.97
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INTEREST ON FUNDED DEBT:	
Fixed interest bearing obligations	\$12,093,097.86
Convertible adjustment mortgage bonds (5% declared)	9,143,684.65

Interest on funded debt	21,236,782.51
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Net income	\$ 9,261,971.46
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Income applied to sinking and other reserve funds	11,638.55
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Net income transferred to Profit and Loss	\$ 9,250,332.91
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[ADVERTISEMENT]

Capital Stock

On January 14, 1928, the share capital of the Company consisted of 1,188,458 shares of Preferred Stock, par value \$100.00 per share, and 1,174,060 shares of Common Stock, without par value, issued in connection with the acquisition of the property of Chicago, Milwaukee and St. Paul Railway Company.

Preferred Stock has been increased 3,292 shares, issued in payment of unsecured claims against the Chicago, Milwaukee and St. Paul Railway Company.

The Capital Stock outstanding as of December 31, 1928, was as follows:

Preferred Stock, 1,191,750 Shares \$119,175,000.00
Common Stock, 1,174,060 Shares (No par value)

Funded Debt Unmatured

In connection with the acquisition of the property of Chicago, Milwaukee and St. Paul Railway Company the Company assumed \$154,479,000, principal amount, of the funded debt outstanding, secured by mortgages on properties acquired by the Company and by equipment trusts, and issued \$106,395,096, principal amount, of its own Fifty Year Five Per Cent. Mortgage Gold Bonds, Series A, and \$182,873,693, principal amount, of its own Five Per Cent. Convertible Adjustment Mortgage Gold Bonds, Series A.

The funded debt was increased during the year by \$24,000,000, the principal amount of General Mortgage 4½% bonds Series E, sold at par, to provide for the retirement of \$14,000,000 principal amount of Ten Year, First Mortgage Bonds Security, Gold Loan of 1924, bearing interest at 6% per annum; part payment of new equipment purchased under Equipment Trusts; additions and betterments to the property; and other corporate purposes.

It was also increased by \$8,911,000 par value of Equipment Trust Certificates, Series E, F, G and H, issued and sold. By the issue of the Equipment Trust Certificates, Series G and H, and the payments of \$677,668.69 in cash, the Equipment Leases dated April 30, 1927, and June 18, 1927, from Pullman Car & Manufacturing Corporation and The Bettendorf Company, respectively, to the Receivers of Chicago, Milwaukee and St. Paul Railway Company, were cancelled. The unfunded debt of the Company, therefore, was thus reduced by \$2,133,669.

The funded debt was decreased by \$14,000,000, principal amount, of Ten Year 6%, First Mortgage Bonds Security, Gold Loan of 1924, due January 1, 1934, but called for retirement July 1, 1928, (\$688,000, principal amount, of which, however, have not been presented for retirement and are still outstanding) and by \$3,280,500, principal amount, of Equipment Trust Notes maturing during the year.

The net increase in the amount of Funded Debt was \$15,630,500.

Funded Debt outstanding, in the hands of the public as of December 31, 1928, amounted to \$459,378,289.

Description of Security	Date Sold
Chicago, Milwaukee and St. Paul Railway Company General Mortgage Gold Bonds, Series E—4½%	May 29, 1928
Chicago, Milwaukee, St. Paul and Pacific Railroad Equipment Trust Certificates, Series E—4½%	July 12, 1928
Chicago, Milwaukee, St. Paul and Pacific Railcad Equipment Trust Certificates, Series F—4½%	July 12, 1928
Chicago, Milwaukee, St. Paul and Pacific Railroad Equipment Trust Certificates, Series G—4½%	July 12, 1928
Chicago, Milwaukee, St. Paul and Pacific Railroad Equipment Trust Certificates, Series H—4½%	July 12, 1928

Total

Treasury Bonds

At the close of the year ended December 31, 1928 there were in the Treasury of the Company bonds to the amount of \$26,270,000.00

Composed of the following:

C. M. & St. P. Ry. Co. General Mortgage Bonds—Series D 5%: Pledged under Ten Year 6% First Mortgage Bonds Security, Gold Loan of 1924 called for retirement July 1, 1928 of which \$688,000, principal amount, were not presented as of December 31, 1928	\$20,000,000.00
In Treasury—Unpledged	5,453,000.00

C. M. & St. P. Ry. Co. General Mortgage Bonds—Series A 4%: In Treasury—Unpledged	759,000.00
Milwaukee & Northern R. R. Co. First Mortgage 4½% Bonds: In Treasury—Unpledged	38,000.00

Milwaukee & Northern R. Co. Consolidated Mortgage 4½% Bonds: In Treasury—Unpledged	20,000.00
Total Treasury Bonds	\$26,270,000.00

INVESTMENT IN ROAD AND EQUIPMENT

The expenditures chargeable to Investment in Road and Equipment during the period January 14 to December 31, 1928, and the total Investment in Road and Equipment December 31, 1928, were as follows:

Equipment purchased and constructed, January 14 to December 31, 1928:

1 Narrow gauge steam locomotive, purchased	\$ 5,014.93
300 Automobile cars, purchased	790,161.95
1600 Box cars, purchased	3,402,821.95
650 Stock cars, purchased	1,106,191.55
552 Coal cars, purchased	1,303,709.56
2 Flat cars, purchased	14,736.79
15 Gas electric motor cars, purchased	631,492.52
10 Baggage and express cars, purchased	126,925.99
10 Roller bearing baggage and express cars, constructed	179,910.59
1 Car float, purchased	50,535.43
2 Locomotive cranes, purchased	41,613.84
2 Ballast dressing machines, purchased	22,400.00
2 Burro cranes, purchased	22,637.62
1 Company service car, purchased	682.39
3 Company service cars, constructed	2,573.69
Miscellaneous Equipment:	
8 Automobile trucks, purchased	8,036.97
1 Ford roadster, purchased	511.16
1 Chevrolet sedan, purchased	448.50
Other additions and betterments to Equipment:	
2 Compartment sleeping cars converted to buffet lounge cars	19,330.08
4 Observation cars converted to parlor cars	24,983.22
164 Gondola cars converted to flat cars	53,246.36
Miscellaneous conversion of equipment	88,804.63

Par Value	Selling Price	Discount	Expense	Net Proceeds Realized
\$21,000,000	Par	.....	\$34,590.40	\$23,965,409.60
2,535,000	97.55%	\$ 62,107.50	4,715.07	2,468,177.43
4,920,000	97.55%	120,540.00	7,659.52	4,791,800.48
871,000	97.55%	21,339.50	2,467.75	847,192.75
585,000	97.55%	14,332.50	2,072.69	568,594.81
\$32,911,000	.....	\$218,319.50	\$51,505.43	\$32,641,175.07

Improvements to other equipment	468,263.93
---------------------------------	------------

Gross Additions and Betterments—Equipment	\$ 8,365,033.65
Less original cost of equipment destroyed, sold, taken down, or converted	503,826.53

Net Additions and Betterments—Equipment	\$ 7,861,207.12
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Additions and Betterments—Road—January 14 to December 31, 1928:	
Land for transportation purposes	\$ 261,940.24
Grading	613,278.24
Tunnels and subways	1,275.25
Bridges, trestles and culverts	1,004,382.61
Ties	184,779.35
Rails	786,510.67
Other track material	1,678,057.43

Ballast	61,531.63
Track laying and surfacing	220,981.04
Right of way fences, etc.	35,435.48
Crossings and signs	305,139.63
Station and office buildings	394,309.15
Roadway and miscellaneous buildings	48,498.51
Water and fuel stations	324,063.21
Shops and engine houses	174,800.95
Grain elevators	8,721.00
Wharves and docks	75,055.44
Telegraph and telephone lines	144,616.99
Signals and interlockers	121,301.45
Power stations, transmission systems, etc.	69,083.44
Paving and assessments	57,203.78
Roadway machines and tools	64,283.46
Shop machinery	207,514.53
Miscellaneous	115,196.30
Gross Additions and Betterments	
—Road	\$6,957,959.78

GENERAL BALANCE SHEET AS OF DECEMBER 31, 1928
ASSET SIDE

INVESTMENTS:

Road and equipment	\$682,548,785.91
Improvements on leased railway property	330,656.63
Sinking funds	18,351.89
Deposits in lieu of mortgaged property sold	76,547.18
Miscellaneous physical property	4,688,953.95

Investments in affiliated companies:

Stocks	\$ 5,413,827.40
Bonds	1,160,800.00
Notes	11,585,967.81
Advances	7,080,890.78
	25,241,485.99

Other Investments:

Stocks	\$ 7,855.39
Bonds	166,700.00
Notes	538,774.34
Miscellaneous	3,548.89
	716,878.62

Total investments \$713,621,660.17

CURRENT ASSETS:

Cash	\$ 7,802,260.84
Demand loans	10,600,000.00
Time deposits	5,453,490.41
Special deposits	38,940.00
Loans and bills receivable	5,011,102.43
Traffic and car-service balances receivable	754,333.92
Due from agents and conductors	3,943,319.34
Miscellaneous accounts receivable	3,214,180.58
Material and supplies	12,872,138.01
Interest and dividends receivable	472,507.85
Rents receivable	354.00
Other current assets	88,378.32
	50,251,005.70

Total current assets

DEFERRED ASSETS:

Working fund advances	\$ 48,290.69
Other deferred assets	2,674,455.38
Total deferred assets	2,722,746.07

UNADJUSTED DEBITS:

Insurance premiums paid in advance	\$ 16,963.62
Other unadjusted debits	4,181,497.36
	4,198,460.98

Total unadjusted debits \$70,793,872.92

GRAND TOTAL

Profit and Loss Account January 14 to December 31, 1928, Inclusive

DEBIT	
Appropriated from surplus account of donations	\$ 100,858.62
Debt discount extinguished through surplus	250,875.81
Loss on retired road	256,597.84
Miscellaneous debits	399,467.58
Credit balance, December 31, 1928, carried to general balance sheet	8,382,072.44
	\$9,389,872.29

Credit—Road property retired or converted **1,534,986.91**Net Additions and Betterments—Road **5,422,972.87**Net Additions and Betterments—Road and Equipment **\$ 13,284,179.99**
Road and Equipment, January 14, 1928 **669,264,605.92**Road and Equipment, December 31, 1928 **\$682,548,785.91**

General balance sheet, income, profit and loss and other tables relating to corporate affairs and statements showing results of operation are appended hereto.

The Board records its appreciation of the co-operation and the loyal and efficient services rendered by the officers and employees throughout the year.

By order of the Board of Directors,

April 18, 1929

H. A. SCANDRETT,
President.GENERAL BALANCE SHEET AS OF DECEMBER 31, 1928
LIABILITY SIDECAPITAL STOCK:
Common stock:
In hands of public (1,174,060 shares—no par value) **\$137,709,450.19**Preferred stock:
In hands of public **119,175,000.00**Total Capital Stock **\$256,884,450.19**GOVERNMENTAL GRANTS:
Grants in aid of construction **2,810.80**

FUNDED DEBT—UNMATURED:

Bonds:
In hands of Public:
Fixed interest bearing **\$237,762,096.00**
Contingent interest bearing **182,873,693.00**
In Treasury of Company **6,270,000.00**
Pledged for loan **20,000,000.00** **\$446,905,789.00**Equipment Obligations:
Equipment gold notes **7,668,500.00**
Equipment Trust certificates **31,074,000.00**Less bonds unsold:
Held in Treasury or pledged **26,270,000.00**
Total Funded Debt unmatured **459,378,289.00**Total Capital Stock, Funded Debt and Governmental Grants **\$716,265,549.99**

CURRENT LIABILITIES:

Loans and bills payable **\$ 293,088.93**
Traffic and car-service balances payable **3,313,695.55**
Payrolls and vouchers **10,293,502.23**
Miscellaneous accounts payable **343,677.23**
Interest matured unpaid **2,985,202.67**
*Funded debt matured unpaid **692,000.00**Unmatured interest accrued **8,350,530.16**
Unmatured rents accrued **302,206.53**
Other current liabilities **563,219.45**Total current liabilities **27,137,123.12**

DEFERRED LIABILITIES:

Other deferred liabilities **\$ 1,020,417.09**Total deferred liabilities **1,020,417.09**

UNADJUSTED CREDITS:

Tax liability **\$ 8,223,880.33**Accrued depreciation—Equipment **5,200,655.40**Other unadjusted credits **4,450,293.51**Total unadjusted credits **17,874,829.24**

CORPORATE SURPLUS:

Additions to property through income and surplus **\$ 100,858.62**Sinking fund reserve—Bell, Bay & Brit. Col. R. R. Co. **13,022.42**Total appropriated surplus **\$ 113,881.04**Profit and loss, credit balance **8,382,072.44**Total corporate surplus **8,495,953.48**GRAND TOTAL **\$770,793,872.92**

†Includes \$2,563,348.75 payable January 1, 1929.

*Includes—Ten Year First Mortgage Bonds Security Gold Loan of 1924, called as of July 1, 1928 **\$688,000.00**Miscellaneous matured bonds covered by cash deposits **4,000.00**

\$692,000.00

CREDIT

Credit balance transferred from Income **\$9,250,332.91**Profit on road and equipment sold **25,573.00**Unrefundable overcharges **6,173.57**Construction donations **100,858.62**Miscellaneous credits **6,934.19**

\$9,389,872.29

[ADVERTISEMENT]

Thirteenth Annual Report of the Wabash Railway Company

Year Ended December 31, 1928

To the Stockholders of the Wabash Railway Company:

The Board of Directors submit the following report of the operations for the year ended December 31, 1928:

	1928	1927	Increase	Decrease
AVERAGE MILEAGE OPERATED	2,524.20	2,524.20		
OPERATING REVENUES (See page 12)	\$71,072,991.07	\$67,108,153.52	\$ 3,964,837.55	
OPERATING EXPENSES (See pages 21 to 24)	52,411,567.67	51,379,146.87	1,032,420.80	
NET OPERATING REVENUE	\$18,661,423.40	\$15,729,006.65	\$ 2,932,416.75	
RAILWAY TAX ACCRUALS	\$ 3,052,356.85	\$ 2,787,694.52	\$ 264,662.33	
UNCOLLECTIBLE RAILWAY REVENUE	13,667.03	9,672.17	3,994.86	
TOTAL	\$ 3,066,023.88	\$ 2,797,366.69	\$ 268,657.19	
OPERATING INCOME	\$15,595,399.52	\$12,931,639.96	\$ 2,663,759.56	
OTHER OPERATING INCOME:				
Rent from Locomotives	\$ 70,342.19	\$ 82,045.90		
Rent from Passenger-Train Cars	59,257.32	71,603.48		
Rent from Floating Equipment	85,939.69	57,880.69	\$ 28,059.00	
Rent from Work Equipment	22,349.60	22,258.06	91.54	
Joint Facility Rents	457,118.19	446,877.56	10,240.63	
TOTAL	\$ 695,006.99	\$ 680,665.69	\$ 14,341.30	
TOTAL OPERATING INCOME	\$16,290,406.51	\$13,612,305.63	\$ 2,678,100.86	
DEDUCTIONS FROM OPERATING INCOME:				
Hire of Freight Cars—Debit Balance	\$ 2,171,711.31	\$ 1,933,814.40	\$ 237,896.91	
Rent for Locomotives	114,753.20	96,741.29	18,011.91	
Rent for Passenger-Train Cars	65,865.66	74,840.64		
Rent for Work Equipment	48,596.97	52,963.52		
Joint Facility Rents	1,939,440.01	1,842,268.57	97,171.44	
TOTAL	\$ 4,340,367.15	\$ 4,000,628.42	\$ 339,738.73	
NET OPERATING INCOME, SECTION 422 TRANSPORTATION ACT 1920	\$11,950,039.36	\$ 9,611,677.23	\$ 2,338,362.13	
NONOPERATING INCOME:				
Income from Lease of Road	\$ 27,841.19	\$ 21,718.50	\$ 6,122.69	
Miscellaneous Rent Income	265,185.61	210,358.46	54,827.15	
Miscellaneous Nonoperating Physical Property	68,152.32	35,447.47	32,704.85	
Dividend Income	947,800.75	1,359,387.47		
Income from Funded Securities	83,478.58	81,911.25	1,567.33	\$ 411,586.72
Income from Unfunded Securities and Accounts	239,679.14	270,348.11		
Income from Sinking and other Reserve Funds	212.50	212.50		
Miscellaneous Income	3,505.72	1,813.93	1,691.79	
TOTAL	\$ 1,635,855.81	\$ 1,981,197.69		\$ 345,341.88
GROSS INCOME	\$13,585,895.17	\$11,592,874.92	\$ 1,993,020.25	
DEDUCTIONS FROM GROSS INCOME:				
Rent for Leased Roads	\$ 363,633.53	\$ 364,948.24		
Miscellaneous Rents	21,189.00	23,370.16		
Miscellaneous Tax Accruals	84,985.09	30,538.65	\$ 54,446.44	
Interest on Funded Debt	5,936,108.95	5,496,348.20	439,760.75	
Interest on Unfunded Debt	665,664.87	814,331.28		
Amortization of Discount on Funded Debt	109,275.68	94,703.90	14,531.78	148,666.41
Miscellaneous Income Charges	3,801.04	5,024.26		
TOTAL	\$ 7,184,618.16	\$ 6,829,264.69	\$ 355,353.47	
NET INCOME	\$ 6,401,277.01	\$ 4,763,610.23	\$ 1,637,666.78	

Operating Revenues

The operating revenues for the Year 1928 compare with 1927 as follows:

	1928	1927	Per Cent Increase or Decrease
Freight	\$58,840,270.65	\$53,992,504.52	\$4,847,766.13 8.98
Passenger	7,194,988.17	8,153,605.96	958,617.79 11.76
Mail	853,779.83	785,579.86	68,199.97 8.68
Express	1,553,661.48	1,538,874.08	14,787.40 .96
Miscellaneous	2,630,290.94	2,637,589.10	7,298.16 .28
Total	\$71,072,991.07	\$67,108,153.52	\$ 3,964,837.55 5.91

A comparison of freight revenue by general classes of traffic follows:

	1928	1927	Per Cent Increase or Decrease
Products of Agriculture	\$ 9,194,074.91	\$ 8,089,620.27	\$ 1,104,454.64
Products of Animals	6,540,103.67	6,699,960.82	159,857.15
Products of Mines	8,335,955.57	8,171,430.48	164,525.09
Products of Forests	2,281,052.30	2,258,558.97	22,493.33
Manufactures and Miscellaneous	24,762,214.51	21,410,947.04	3,351,267.47
Merchandise	7,726,869.69	7,361,986.94	364,882.75
Total	\$58,840,270.65	\$53,992,504.52	\$ 4,847,766.13

The decrease in passenger revenue of \$958,617.79 was due to extension of motor bus lines and increased use of private automobiles.

Operating Expenses

The operating expenses for the year 1928 compare with 1927 as follows:

	1928	1927	Increase or Decrease	Per Cent Increase or Decrease
Maint. of Way and Structures	\$ 9,496,663.03	\$ 9,340,819.52	\$ 155,843.51	1.67
Maint. of Equipment	11,815,468.66	11,880,995.35	65,526.69	.55
Traffic	2,037,900.66	1,969,161.07	68,739.59	3.49
Transportation—Rail Line	26,784,642.81	25,924,498.81	860,144.00	3.32
Miscellaneous Operations	421,650.43	404,023.14	17,627.29	4.36
General	2,223,050.89	2,193,047.57	30,003.32	1.37
Transp. for Investment—Cr.	367,808.81	333,398.59	34,410.22	10.32
Total Operating Expenses	\$52,411,567.67	\$51,379,146.87	\$ 1,032,420.80	2.01

The ratio of operating expenses to revenues for the year 1928 was 73.74% as compared with 76.56% for the year 1927, a decrease in the per cent of 2.82.

The increase in Maintenance of Way and Structures expense is due to the increase in rail laid, ballast inserted, and roadway maintenance in connection therewith, as well as the general repairs to freight stations at St. Louis and Detroit.

Financial

CAPITAL STOCK. The par value of Capital Stock issued to December 31, 1928, was \$138,492,967.17, there having been no change during the year.

Under the Articles of Incorporation, the holders of the Five Per Cent Convertible Preferred Stock B, may, at any time after August 1, 1918, and up to thirty days prior to any

Wabash Railway Company

CONDENSED GENERAL BALANCE SHEET
December 31, 1928, Compared with Previous Year

ASSETS	1928	1927	Increase	Decrease
INVESTMENTS:				
Investment in Road and Equipment	\$281,230,395.75	\$277,102,749.44	\$ 4,127,646.31	\$ 296.67
Sinking Funds	62.51	359.18		
Miscellaneous Physical Property	2,008,497.26	2,003,409.80	5,087.46	
Investments in Affiliated Companies	9,577,050.06	9,197,607.65	379,442.41	
Other Investments	23,672,961.56	23,635,784.31	37,177.25	
TOTAL	\$316,488,967.14	\$311,939,910.38	\$ 4,549,056.76	
CURRENT ASSETS:				
Cash	\$ 3,719,323.82	\$ 2,698,072.03	\$ 1,021,251.79	
Special Deposits	4,467,717.87	2,325,903.72	2,141,814.15	
Loans and Bills Receivable	1,553,217.30	908,915.55	644,301.75	
Traffic and Car-Service Balances Receivable	2,168,546.91	1,271,671.28	896,875.63	
Net Balance Receivable from Agents and Conductors	318,774.43	280,326.02	38,448.41	
Miscellaneous Accounts Receivable	1,862,884.86	2,122,936.30		\$ 260,051.44
Material and Supplies	4,691,575.26	4,805,118.41		113,543.15
Interest and Dividends Receivable	324,251.89	283,655.93	40,595.96	
Rents Receivable	94,517.50	70,651.48	23,866.02	
Other Current Assets	60,805.44	48,364.49	12,440.95	
TOTAL	\$ 19,261,615.28	\$ 14,815,615.21	\$ 4,446,000.07	
DEFERRED ASSETS:				
Working Fund Advances	\$ 214,039.99	\$ 212,982.99	\$ 1,057.00	
Insurance and Other Funds	46,621.50	43,544.36	3,077.14	
Other Deferred Assets	11,500.45	11,232.73	267.72	
TOTAL	\$ 272,161.94	\$ 267,760.08	\$ 4,401.86	
UNADJUSTED DEBITS:				
Rents and Insurance Premiums Paid in Advance	\$ 79,404.48	\$ 77,272.01	\$ 2,132.47	
Discount on Funded Debt	3,454,194.23	2,274,733.42	1,179,460.81	
Other Unadjusted Debits	1,565,769.28	758,192.55	807,576.73	
Securities Issued or Assumed—Unpledged	999,406.63	1,041,286.63		\$ 41,880.00
Securities Issued or Assumed—Pledged	1,037,924.00	1,037,924.00		
TOTAL	\$ 7,136,698.62	\$ 5,189,408.61	\$ 1,947,290.01	
TOTAL ASSETS	\$343,159,442.98	\$332,212,694.28	\$10,946,748.70	

date fixed for the redemption of the entire issue of Five Per Cent Profit Sharing Preferred Stock A, convert the same into, and exchange the same for, Five Per Cent Profit Sharing Preferred Stock A and Common Stock of the corporation, such conversion to be at the rate of \$50.00 par value of Five Per Cent Profit Sharing Preferred Stock A and \$50.00 par value of Common Stock for each \$100.00 par value of Five Per Cent Convertible Preferred Stock B, with a proper adjustment of declared and unpaid dividends.

Since August 1, 1918, Five Per Cent Convertible Preferred Stock B of a par value of \$46,266,100.00 has been surrendered and exchanged for \$23,133,050.00 par value of Five Per Cent Profit Sharing Preferred Stock A and \$23,133,050.00 par value of Common Stock. During the year no Five Per Cent Convertible Preferred Stock B was converted into Five Per Cent Profit Sharing Preferred Stock A and Common Stock.

FUNDED DEBT. The total funded debt on December 31, 1928, was \$127,705,187.97, a net increase of \$15,659,180.38 as compared with December 31, 1927. This increase was due to issuing certain obligations and retiring others as follows:

ISSUED DURING THE YEAR.

Refunding and General Mortgage Bonds,	
Series C	\$17,867,000.00
RETIRED DURING THE YEAR.	
Equipment Trust of 1920—	
6% Certificates	\$755,400.00
Equipment Trust of 1922—	
5% Certificates	283,000.00
Equipment Trust of 1923—	
Series C	134,000.00
Equipment Trust of 1924—	
Series D	166,000.00
Equipment Trust of 1924—	
Series E	171,000.00
Equipment Trust of 1925—	
Series F	279,000.00
Equipment Trust of 1927—	
Series G	175,000.00
Gondola Car Agreement of 1924	102,419.62
Kansas City, Excelsior Springs	
and Northern Railway Com-	
pany First Mortgage Bonds ..	100,000.00
Detroit & Chicago Extension	
First Mortgage Bonds	42,000.00
	2,207,819.62

Net Increase

The issue of \$17,867,000.00 par value Refunding and General Mortgage Bonds, Series C, was dated April 1, 1928, bearing interest at the rate of four and one-half per cent per annum, payable semi-annually on April 1st and October 1st of each year and will mature April 1, 1978. This issue was used to

reimburse the Treasury of the Company for capital expenditures heretofore made, purchase of capital stock of The Ann Arbor Railroad Company, and to provide additional funds for capital purposes.

Road and Equipment

The more important items are as follows:

Road

Land for yard and terminal extensions	\$ 489,319.36
Grade separation	577,147.22
River protection	118,029.59
Signals and interlockers	110,265.67
Crossings and signs	63,834.70
Train yards	145,061.01
Passing and other track additions and extensions ..	311,349.21
Bridges, trestles and culverts ..	189,114.61
Rail and other track material ..	457,368.44
Ballast	801,360.77
Widening cuts and fills	59,203.83
Freight and passenger stations and other buildings ..	654,815.12
Grain elevators	60,319.67
Special assessments	44,029.80
Roadway machines	12,327.60
Shop tools and power plant machinery ..	58,441.64
Application of tie plates	62,697.39
	\$ 4,214,685.63

Equipment

NEW	
10 coal cars	\$ 21,344.43
3 wheel cars	\$ 3,359.23
1 locomotive crane	14,826.78
	18,186.01
	\$ 39,530.44

The following is a general description of the expenditures enumerated:

The policy of improving condition of ballast in main tracks was continued by applying 105,366 cubic yards of washed gravel, 273,638 cubic yards of crushed rock and 24,398 cubic yards of burnt clay.

One hundred nine miles of new 110 lb. rail was laid, replacing lighter weights.

A combination pile, stone and wire mattress 2,500 feet long was placed in the Missouri River at DeWitt, Mo., for bank protection.

For more efficient and economical handling of fruit and vegetables, a new concrete and brick fruit auction house with

Wabash Railway Company

CONDENSED GENERAL BALANCE SHEET
December 31, 1928, Compared with Previous Year

LIABILITIES	1928	1927	Increase	Decrease
STOCK: Capital Stock	\$138,492,967.17	\$138,492,967.17	.....	.....
LONG TERM DEBT: Funded Debt Unmatured	\$127,705,187.97	\$112,046,007.59	\$15,659,180.38	.....
CURRENT LIABILITIES: Loans and Bills Payable	\$ 1,698,287.22	\$ 1,500,000.00	\$ 158,513.19	\$ 1,500,000.00
Traffic and Car-Service Balances Payable	5,170,106.08	5,832,514.67	.....	662,408.59
Audited Accounts and Wages Payable	291,498.17	297,703.72	.....	6,205.55
Miscellaneous Accounts Payable	255,902.00	253,554.50	2,347.50	.....
Interest Matured Unpaid	4,268.75	4,292.50	.....	23.75
Dividends Matured Unpaid	5,200.00	200.00	5,000.00	.....
Funded Debt Matured Unpaid	1,649,369.29	1,480,734.28	168,635.01	.....
Unmatured Interest Accrued	260,884.23	239,100.96	21,783.27	.....
Unmatured Rents Accrued	222,164.73	211,055.10	11,109.63	.....
TOTAL	\$ 9,557,680.47	\$ 11,358,929.76	.....	\$ 1,801,249.29
DEFERRED LIABILITIES: Other Deferred Liabilities	\$ 7,150,422.17	\$ 15,208,272.81	.....	\$ 8,057,850.64
UNADJUSTED CREDITS: Tax Liability	\$ 2,392,148.71	\$ 2,174,148.18	\$ 218,000.53	.....
Insurance and Casualty Reserves	118,589.88	103,475.48	15,114.40	.....
Accrued Depreciation—Equipment	12,085,738.23	10,483,379.66	1,602,358.57	.....
Other Unadjusted Credits	2,378,343.74	1,968,787.62	409,556.12	.....
TOTAL	\$ 16,974,820.56	\$ 14,729,790.94	\$ 2,245,029.62	.....
CORPORATE SURPLUS: Additions to Property	\$ 953,493.63	\$ 839,276.07	\$ 114,217.56	.....
Profit and Loss Balance	42,324,871.01	39,537,449.94	2,787,421.07	.....
TOTAL	\$ 43,278,364.64	\$ 40,376,726.01	\$ 2,901,638.63	.....
TOTAL LIABILITIES	\$343,159,442.98	\$332,212,694.28	\$10,946,748.70	.....

appurtenances, was constructed at St. Louis, Mo. A new brick passenger station was erected at Huntington, Ind.

The program for the replacing of pile and temporary bridges with permanent structures was continued.

The work of eliminating grade crossings at State Highway No. 47, Warrenton, Mo., State Highway No. 3, Udell, Ia., Seventh Street, Decatur, Ill., Loomis Street, Chicago, Ill., Raupp Road and Livernois Avenue, Detroit, Mich., and Delmar Avenue, St. Louis, Mo., was completed. Work was well under way on the separation of grades at Hastings and Russell Streets, Detroit, Mich., West Fort Street, Detroit, Mich., and State Highway No. 6, Moravia, Ia.

A new 150 foot double track concrete and steel bridge was constructed over North Broadway, St. Louis, Mo., to replace a 74 foot single track masonry and steel bridge, made necessary as result of widening street.

Automatic block signals were installed between Granite City and Edwardsville, Ill., and between Litchfield and Mt. Olive, Ill., making a total of 634.15 miles of track now protected by automatic block signals. Automatic signals at crossing with the Chicago, Burlington & Quincy Railroad at Golden, Ill., were installed.

Crossing signals for protection of highway traffic were installed at the following points: Hannibal, Mo., Chillicothe, Mo., Mt. Olive, Ill., Manhattan, Ill., Riverton, Ill., Litchfield, Ill., Tolono, Ill., Williamsport, Ind., Wabash, Ind., and Napoleon, Ohio.

Federal Valuation

Final briefs in the Federal Valuation Case were filed and oral argument had with the Interstate Commerce Commission during the early part of the year. Since that time the Interstate Commerce Commission has been reviewing the evidence submitted, as well as the briefs filed, and is now engaged in the process of preparing a final valuation of the Company's properties.

Development

The Company purchased 63.50 acres of land at Lafayette, Ind., 3.96 acres at Toledo, Ohio, and 2.70 acres at Detroit, Mich., for the enlargement of terminal facilities, also 38.56 acres of land at Delta, Ohio, for additional interchange facilities.

There were one hundred and fifteen new industries located on the tracks of your Company.

General Remarks

In the latter part of the year the Company entered into agreements with the American Car and Foundry Company, and the Pullman Car and Manufacturing Corporation, for the building of 2,000 40-ton capacity, steel frame, single sheathed automobile cars, for delivery the early part of the coming year. By order of the Board of Directors.

J. E. TAUSSIG,
President.

[ADVERTISEMENT]

Financial News

(Continued from page 1073)

conversion of such of the bonds as may be presented for that purpose.

NEW ORLEANS, TEXAS & MEXICO.—*Annual Report.*—The annual report of this company for 1928 shows net income after interest and other charges of \$1,042,371, as compared with net income of \$475,723 in 1927. Selected items from the income statement follow:

NEW ORLEANS, TEXAS & MEXICO		
1928	1927	Increase or Decrease
Average Mileage operated	1,023.25	992.83
RAILWAY OPERATING REVENUES	14,713,741	15,428,651
Maintenance of	51,000	34,000
		17,000

way	2,450,282	3,195,139	—744,857	Interest on funded debt	2,331,864	2,050,239	281,625
Maintenance of Equipment	2,558,335	2,782,675	—224,340	TOTAL DEDUCTIONS FROM GROSS INCOME	2,401,557	2,152,479	249,078
Transportation	4,361,474	4,977,381	—615,908	NET INCOME	1,042,371	475,723	566,648
TOTAL OPERATING EXPENSES	10,543,521	12,084,940	—1,541,419				
Operating ratio							
NET REVENUE FROM OPERATIONS	4,170,221	3,343,711	826,509				
Railway tax accruals	572,687	744,088	—171,401				
Railway operating income	3,584,735	2,590,192	994,540				
Hire of freight Cars—Dr.	500,496	434,434	66,062				
Joint facility rents—Dr.	222,091	242,841	—20,750				
NET RAILWAY OPERATING INCOME	2,943,821	1,910,674	1,033,147				
Non-operating income	500,107	717,528	—217,420				
GROSS INCOME	3,443,929	2,628,202	815,727				
Rent for leased roads	51,000	34,000	17,000				

NEW YORK CENTRAL.—*Construction Authorized.*—The Interstate Commerce Commission has authorized this company to construct a line from Emeryville, N. Y., to Fowler, a distance of 3.7 miles.

NEW YORK CENTRAL.—*Unification.*—This company has filed with the Interstate Commerce Commission a petition asking the commission to enter a final order authorizing its lease of the properties of the Michigan Central and Cleve-

(Continued on page 1083)

Twelfth Annual Report of Missouri Pacific Railroad Company

Year Ended December 31, 1928

St. Louis, Mo., March 1, 1929.

TO THE STOCKHOLDERS:

There is submitted herewith report of the operations and affairs of the Company as of December 31, 1928.

Corporate Income Statement

FOR THE YEAR ENDED DECEMBER 31, 1928, COMPARED WITH THE PREVIOUS YEAR			
	1928	1927	Increase
Railway Operating Revenues	\$131,576,525.15	\$125,728,405.41	\$5,848,119.74
Railway Operating Expenses	99,091,201.26	99,565,997.86	x 474,796.60
Net Revenue from Railway Operations	\$ 32,485,323.89	\$ 26,162,407.55	\$ 6,322,916.34
Railway Taxes and Uncollectible Railway Revenue	\$ 5,851,357.22	\$ 4,815,607.56	\$ 1,035,749.66
Railway Operating Income	\$ 26,633,966.67	\$ 21,346,799.99	\$ 5,287,166.68
Other Operating Income	1,703,160.15	1,502,895.16	200,264.99
Total Operating Income	\$ 28,337,126.82	\$ 22,849,695.15	\$ 5,487,431.67
Deductions from Operating Income	6,989,590.61	5,950,196.2	1,039,393.89
Net Railway Operating Income	\$ 21,347,536.21	\$ 16,899,498.43	\$ 4,448,037.78
Non-Operating Income	4,037,602.63	3,823,766.75	213,835.88
Gross Income	\$ 25,385,138.84	\$ 20,723,265.18	\$ 4,661,873.66
Deductions from Gross Income	15,872,447.88	16,322,068.90	x 449,621.02
Net Income transferred to Profit and Loss	\$ 9,512,690.96	\$ 4,401,196.28	\$ 5,111,494.68
x Decrease.			

Dividends

A regular quarterly dividend of 1 1/2%, or \$886,381.10, for the three months ending December 31, 1928, and a dividend of 1 1/2%, or \$1,063,657.31, on account of unpaid accumulated dividends, were declared on the PREFERRED STOCK, payable December 31, 1928, to holders of stock as of December 15, 1928, the total dividends for the year being 2 3/4%, or \$1,950,038.41.

Income

A brief comparative statement of the Corporate Income is shown above, subdivided to indicate the "Net Railway Operating Income" defined in the Transportation Act of 1920.

Operations (Compared with Previous Year)

The results from operations for the year show very substantial increases in volume of freight traffic handled and in gross and net income.

Total Railway Operating Revenues for the year were \$131,576,525.15 as compared with \$125,728,405.41 in the previous year, an increase of \$5,848,119.74, or 4.65%.

The increase in Freight Revenue was \$6,599,803.51, or 6.55%. The principal increases being Products of Agriculture, \$4,084,874.91 and Manufactures and Miscellaneous, \$3,638,038.64. The increase in revenue from Wheat, included in Products of Agriculture, was \$2,023,712.14 and from Corn, Oats and other Grain, \$2,008,841.04. The principal increases included in Manufactures and Miscellaneous were Petroleum Oils and Products \$503,695.27, Automobiles and Auto Trucks \$1,165,336.33 and other Manufactures and Miscellaneous \$1,903,340.25.

The Total number of Tons of Revenue Freight Handled increased 7.03% and the Ton Miles increased 9.87%. The Average Revenue Per Ton Mile was 10.41 mills as compared with 10.74 mills in the previous year.

The Passenger Revenue for the Current Year was \$13,552,823.53 as compared with \$14,652,502.50, a decrease of 7.51%. Passengers Carried shows a decrease of 14.77% and the Passengers Carried One Mile, a decrease of 4.82%. The increase in Average Distance Each Passenger Carried was 10.64 miles or 11.67% and the Average Revenue Per Passenger Per Mile was \$0.0309, compared with \$0.0318 last year.

Total Railway Operating Expenses decreased \$474,796.60, or 0.48%.

Expenditures for Maintenance of Way and Structures decreased \$231,333.66. Maintenance of Equipment Expenditures increased \$511,768.71, while the Transportation Expenses decreased \$870,748.94.

Hire of Freight Car Charges show an increase of \$625,570.68 over the previous year, due principally to an increase in use of private car lines, the payments to that account for the year

1928 showing an increase of \$432,270.73. The average miles per car per day for 1928 was 40.63, compared with 38.80 in 1927, 39.66 in 1926, 37.22 in 1925, 33.02 in 1924 and 26.61 in 1923.

Federal Valuation

The hearing before the Interstate Commerce Commission on the formal protest to the Tentative Valuation as of June 30, 1918, which began September 20, 1927, was concluded April 3, 1928. The opening brief was filed June 20, 1928 and the reply brief September 5, 1928. The Commission had not at the close of the year rendered its decision as to final value.

Since the conclusion of the 1918 valuation case before the Commission, attention has been directed to the work of bringing valuations to date. A formal order has been served by the Commission, directing that necessary reports for bringing valuations to date be filed with the Commission within ninety (90) days following March 1, 1929.

Pension System

Three hundred employees were retired in 1928 and fifty-nine pensioned employees died during the year. Since the inauguration of the Pension System, July 1, 1917, one thousand eighty-four employees have been retired and three pensioners have returned to service. The total number of deaths, three hundred thirty-two. At the close of the year, seven hundred forty-nine employees were receiving pensions, averaging \$58.07 per month, involving a monthly expenditure of \$43,493.70.

Capital Stock

No changes have been made in the Capital Stock during the year.

Funded Debt

Long Term Debt outstanding in the hands of the public increased \$23,167,600, the detail of changes being shown on page 13.

First and Refunding Mortgage 5% Bonds, Series G, to the amount of \$3,307,000 and Interim Receipts for Series G Bonds to the amount of \$22,600,000, a total of \$25,907,000, were issued during the year; of this amount \$25,000,000 were sold and \$907,000 placed in the treasury.

Texarkana Union Station Certificates, Series A, to the amount of \$1,500,000 were issued during the year for the purpose of constructing a new union passenger station and facilities at Texarkana, Ark.; the proportion of this liability assumed by your Company based upon a 30% interest, being \$450,000.

Equipment Trust Obligations amounting to \$2,282,400 matured and were paid during the year.

New Lines

There were no new lines constructed during the year. On April 1, 1928, the operated mileage was increased 64.07 miles by the lease of the Chester and Mount Vernon Railroad. The net increase in the owned and operated mileage including this and other changes of minor importance was 64.70 miles.

Missouri Pacific Transportation Company

In November 1928, the Missouri Pacific Transportation Company, a Delaware Corporation, the stock of which is owned by your Company, was organized for the purpose of operating and maintaining, among other things, motor vehicles for the transportation of passengers, baggage, mail, express, freight, and other commodities, in the various States through which we operate.

The handling of traffic, ordinarily carried in local passenger trains, by motor coaches, will be at lower unit costs, and will result in substantial savings through the elimination of non-productive local passenger train miles.

Satisfactory progress is being made in the acquisition of highway franchises, and to date approximately 2,300 miles are being covered by motor coaches operated under regular daily schedules.

Road and Equipment

The expenditures for the year include construction of 19.84 miles of second main track, completing 81.06 miles of the total program begun in 1925 to double track the line from St. Louis to Jefferson City, Mo.; also completion of 6.95 miles of second main track through Gurdon, Ark.; improvements to grain elevator at Omaha, Nebr., increasing capacity of bins

from 450,000 to 1,450,000 bushels; new sheep and cattle feeding facilities at Dodson, Mo.; construction of hold yard and tracks to serve new plant of the Chevrolet Motor Company at Leeds, Mo., and raising of tracks above high water level at various points on the system to insure continued operation of trains during flood periods. New double track bridge was constructed over the Arkansas River at Little Rock, to replace the old Baring Cross Bridge which was destroyed in flood of 1927, and a new Union Station to serve four railroads is in course of construction at Texarkana, Arkansas. In addition to the automatic block signals installed for second main track between St. Louis and Jefferson City, a total of 121 miles was completed during the year, practically of which was installed in State of Arkansas, making a total of 1,293 miles for the system as of December 31, 1928.

There was delivered and put into service during the year 270 Automobile Cars.

Orders have been placed for additional equipment for delivery in 1929, as follows:

25 Switching Locomotives,	2000 Steel Underframe Automobile Cars,
2 Steel Parlor Dining Cars,	500 Steel Hopper Cars,
1 Steel Cafe Club Coach Car,	500 Steel Underframe Stock Cars,
13 Steel Baggage Cars,	60 Steel Underframe Cabooses,
13 Steel Mail and Baggage Cars,	20 Dump Cars,
11 Steel Coaches,	2 Locomotive Cranes,
1000 Steel Underframe Box Cars,	1 Steam Wrecking Crane,
	1 Spreader-Ditcher.

The details of charges to Road and Equipment are shown on Page 18, a summary of which follows:

New Lines Constructed, Completion of	
Prior Years' Projects,	\$ 1,078,298.51
New Lines Purchased,	223,349.06
Second Main Track,	3,815,174.88
Road,	\$12,111,091.86
Less Retirements,	577,950.35
	11,533,141.51

Equipment,	\$ 1,469,602.17
Less Retirements,	2,299,980.76 Cr. 830,378.59

Assets and Liabilities Not Appraised June 1, 1917,	Cr. 15,966.76
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Total Charges to Road and Equipment	\$15,803,618.61
By Order of the Board of Directors,	

L. W. BALDWIN,
President.

Profit and Loss

DECEMBER 31, 1928

Credit Balance, December 31, 1927..	\$48,988,318.98
Credit Balance Transferred from	
Income Account	9,512,690.96
Profit on Road Sold.....	352,414.82
Unrefundable Overcharges	11,292.94
Donations	192,277.19
Miscellaneous Credits	58,300.51
	\$59,115,295.40

Less:

Dividend Appropriations of Surplus	\$1,950,038.41
Surplus Appropriated for Investment in Physical Property.....	192,277.19
Debt Discount Extinguished through Surplus	905,766.93
Loss on Retired Road	622,712.08
Miscellaneous Debits	1,070,253.83
	4,741,048.44

Credit Balance, December 31, 1928..	\$54,374,246.96
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[ADVERTISEMENT]

Financial News

(Continued from page 1081)

land, Cincinnati, Chicago & St. Louis, stating that it had fulfilled the condition specified in the report in which the commission found the leases would be in the public interest that it should make offers to six short lines to acquire their properties for a consideration equal to their commercial value. As a result of negotiation with the short lines the company reported that it had agreed with the International Harvester Company to purchase for \$75,000 the stock of the Owasco River and that the terms for the acquisition of the Federal Valley, the Boyne City, Gaylord & Alpena and the Ulster & Delaware River have been referred to arbitration. Offers have also been made to the Chicago, Attica & Southern and the Fonda, Johnstown & Gloversville and the New York Central has proposed arbitration but has received no replies.

NEW YORK CENTRAL.—Equipment Trust.—This company has been authorized by the Interstate Commerce Commission to issue \$6,300,000 of equipment trust certificates to be sold at not less than 96.84 per cent of par.

NEW YORK, CHICAGO & ST. LOUIS.—Unification Proceedings.—The Interstate

Commerce Commission has authorized this company to intervene in the proceedings on the application of the Pittsburgh & West Virginia for authority to acquire control of the Wheeling & Lake Erie. The Pittsburgh & West Virginia has filed a reply to the Nickel Plate's petition for a vacation of the order by which the commission ordered the Nickel Plate to dispose of its stock in the Wheeling company. It asks the commission to take immediate steps under section 11 of the Clayton act to enforce its order by application to the United States circuit court of appeals for compliance therewith, stating that no change in the status of the case has been created by the action of the Baltimore & Ohio and the New York Central in disposing of their Wheeling stock to the Alleghany Corporation.

NEW YORK, SUSQUEHANNA & WESTERN.—Annual Report.—The annual report of this company for 1928 shows net deficit after interest and other charges of \$235,961. Net deficit in 1927 was \$629,335. Selected items from the income statement follow:

NEW YORK, SUSQUEHANNA & WESTERN	1928	1927	Increase or Decrease
RAILWAY OPERATING REVENUES	5,263,153	5,199,137	64,016
Maintenance of way	783,737	790,695	- 6,958
Maintenance of			

Equipment	764,016	850,111	— 86,395
Transportation	2,430,472	2,651,519	— 221,047
TOTAL OPERATING EXPENSES	4,187,410	4,511,091	— 323,682
Operating ratio	79.56	86.77	— 7.21
NET REVENUE FROM OPERATIONS	1,075,743	688,045	— 387,697
Railway tax accruals	361,967	345,712	16,255
Railway operating income	713,128	341,305	371,823
Hire of freight cars—Dr.	70,992	58,188	12,804
Joint facility rents—Cr.	79,621	70,188	9,433
NET RAILWAY OPERATING INCOME	488,467	102,621	385,846
Non-operating income	78,907	75,129	3,778
GROSS INCOME	567,373	177,749	389,624
Rent for leased roads	24,134	24,128	6
TOTAL DEDUCTIONS FROM GROSS INCOME	803,335	807,085	— 3,750
NET INCOME—deficit	235,961	629,335	— 393,374

READING.—Bond Maturity Extended.—See Atlantic City.

SOUTHERN.—Bonds.—The Interstate Commerce Commission has authorized this company to procure the authentication and delivery of \$5,250,000 of development and general mortgage 4 per cent bonds.

TEXAS & PACIFIC.—Annual Report.—The annual report of this company for

1928 shows net income after interest and other charges of \$7,993,956, equivalent after allowing for dividend requirements on 5 per cent preferred stock, to \$17.56 a share earned on outstanding common stock. This compares with net income of \$4,113,981, or \$7.55 a share, in 1927. Selected items from the income statement follow:

TEXAS & PACIFIC			Increase or Decrease
	1928	1927	
Average mileage operated	2,015.13	1,980.87	34.26
RAILWAY OPERATING REVENUES	50,795,832	38,949,539	11,846,293
Maintenance of way	8,399,109	6,832,210	1,566,899
Maintenance of equipment	7,843,613	6,801,243	1,042,370
Transportation	15,950,920	13,053,386	2,897,534
TOTAL OPERATING EXPENSES	34,536,240	28,797,073	5,739,167
Operating ratio	67.99	73.93	—5.94
NET REVENUE FROM OPERATIONS	16,259,593	10,152,466	6,107,126
Railway tax accruals	2,246,333	1,839,200	407,133
Railway operating income	13,996,990	8,296,789	5,700,200
Hire of freight cars—Dr.	3,267,596	1,768,324	1,499,272
Joint facility rents—Dr.	186,225	84,486	101,739
NET RAILWAY OPERATING INCOME	10,446,475	6,497,569	3,948,906
Non-operating income	533,126	566,106	—32,980
GROSS INCOME	10,979,601	7,063,675	3,915,926
Interest on funded debt	2,829,608	2,752,480	77,128
TOTAL DEDUCTIONS FROM GROSS INCOME	2,985,645	2,949,695	35,950
NET INCOME	7,993,956	4,113,981	3,879,975
Disposition of net income:			
Dividends on No. 5 preferred stock	1,185,150	1,185,150	—

Dividends Declared

Delaware & Hudson.—\$2.25, quarterly, payable June 20 to holders of record May 28a.
Hudson & Manhattan.—Common, 1 1/4 per cent, semi-annually, payable June 1 to holders of record May 16.
Illinois Central.—Common, \$1.75, quarterly, payable June 1 to holders of record May 10.
Norfolk & Western.—Common, \$2.00, quarterly, payable June 19 to holders of record May 31.
Pennsylvania.—\$1.00, quarterly, payable May 31 to holders of record May 1.
Reading.—First Preferred, \$.50, quarterly, payable June 13 to holders of record May 23.
Canadian Pacific—Common, \$2.50, quarterly, payable June 29 to holders of record May 31.
New York, Chicago & St. Louis—Common, \$1.50, quarterly; Preferred, \$1.50, quarterly, both payable July 1 to holders of record May 15.

Average Prices of Stocks and of Bonds

	Apr. 30	Last week	Last year
Average price of 20 representative railway stocks	131.45	131.57	125.71
Average price of 20 representative railway bonds	91.70	91.79	96.15

Valuation Reports

The Interstate Commerce Commission has issued final valuation reports finding the final value for rate-making purposes of the property owned and used for common-carrier purposes as of the respective valuation dates, as follows:

Minnesota, Dakota & Western... \$780,790 1918
Union Terminal (St. Joseph, Mo.) 1,119,488 1917

Railway Officers

Executive

L. C. Sprague, vice-president and general manager of the Uintah Railway, with headquarters at Mack, Colo., has resigned to become president and general manager of the Carrier Holding Corporation at New York, an organization which controls a group of short line railroads. **W. L. Rader**, superintendent, has been promoted to general manager, with headquarters as before at Mack.

James B. Yohe, vice-president of the Pittsburgh & Lake Erie, retired from the service of that road after 49 years of railroad work. He will be succeeded by his son, **Curtis M. Yohe**. James B. Yohe was born on June 24, 1856, in Washington County, Pa. He entered railroad service in June, 1870, serving as extra operator on the Pittsburgh division

University and entered railway service in 1919 with the Pittsburgh & Lake Erie as assistant purchasing agent. In July, 1922, he was promoted to the posi-



Curtis M. Yohe

tion of purchasing agent and in March, 1928, he was appointed assistant to the president, which position he held at the time of his recent appointment to the vice-presidency.



James B. Yohe

Financial, Legal and Accounting

Guy C. Chambers, assistant attorney for Nebraska for the Chicago, Rock Island & Pacific, has been promoted to attorney for Nebraska, with headquarters at Lincoln, Neb., succeeding **Judge E. T. Holmes**, who retired from active service on April 1, at the age of 70 years.

George S. Cowie has been appointed assistant treasurer of the Canadian National, with headquarters at Montreal, Que., succeeding **R. W. Denman**, resigned. This is in addition to Mr. Cowie's present position as assistant treasurer of the Canadian National Steamships.

H. L. Peeples has been appointed auditor of operating expenses of the Central of New Jersey, with headquarters at Jersey City, N. J. Mr. Peeples will have charge of maintenance of way expense accounts. **P. B. Croll** has been appointed auditor of freight traffic at the same point. He will have charge of freight traffic settlements and accounts.

George H. Pabst, Jr., assistant treasurer of the Pennsylvania, with headquarters at Philadelphia, Pa., has been appointed treasurer of the company with the same headquarters, succeeding **Henry H. Lee**, who has resigned from that position to become president of the Penroad Corporation. Mr. Pabst was born in New York City in 1888. He was educated in the public and high schools of Philadelphia and the Evening

School of Accounts and Finance of the University of Pennsylvania. He entered the service of the Pennsylvania in 1906 as a clerk in the accounting department. Three years later he was transferred to the office of the second vice-president. In 1917 he was appointed chief to the



George H. Pabst, Jr.

special assistant to the president, and in July, 1925, he was promoted to the newly created position of analyst in the treasury department. He held this position until December of the following year, when he was appointed assistant treasurer, which position he held at the time of his recent promotion to the position of treasurer.

Operating

P. Rumsey has been appointed assistant superintendent of the Hudson division of the New York Central, with headquarters at New York.

Albert S. Critchfield has been appointed trainmaster of the Lake Superior division of the Northern Pacific, with headquarters at Duluth, Minn.

H. L. Bennett, assistant superintendent of telegraph of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston, Tex., has retired under the pension rules of the company.

A. P. Thompson has been appointed assistant superintendent of the Medicine Hat division of the Canadian Pacific, with headquarters at Bassano, Alta., succeeding **C. W. Atkin**, who has been appointed assistant to the general agricultural agent at Winnipeg, Man.

J. R. Postlethwait, train rule examiner on the Chicago & Alton, has been appointed acting trainmaster of the Bloomington-Chicago district of the Northern division, with headquarters at Bloomington, Ill., temporarily succeeding **D. J. Deasy**, who has been appointed yard efficiency investigator, a newly created position.

J. K. Johnston, superintendent of the Tyrone division of the Pennsylvania,

with headquarters at Tyrone, Pa., has been appointed assistant general superintendent of the Eastern Pennsylvania division. The separate existence of the Tyrone division has been discontinued and its lines have been merged with the Williamsport and Middle divisions.

R. E. Kemper, assistant superintendent of the Henderson and St. Louis division of the Louisville & Nashville, with headquarters at Evansville, Ind., has been promoted to superintendent of that division, with headquarters at the same point, succeeding **Martin Devney**, deceased. **J. H. Fish**, master of trains of the Henderson division, has been appointed assistant superintendent at Evansville to replace Mr. Kemper. **C. R. Bowman**, night chief dispatcher at Evansville, has been promoted to master of trains of the Henderson division, to succeed Mr. Fish.

Traffic

H. F. Hoffmaster, Jr., has been appointed general agent of the Texas City Terminal at Texas City, Tex.

C. W. Atkin, assistant superintendent of the Canadian Pacific, with headquarters at Bassano, Alta., has been appointed assistant general agricultural agent in Western Canada.

A. W. Ackley, assistant New England freight agent of the Delaware & Hudson, with headquarters at Boston, Mass., has been appointed New England freight agent, with the same headquarters, succeeding **F. H. Wheeler**, deceased.

R. H. Miller, assistant general freight agent of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been appointed general freight agent at the same point, succeeding **W. McL. Pomeroy**, who has been appointed general freight agent at Philadelphia.

Frank L. Dunn, who has served as freight representative of the Delaware & Hudson at various points, has been promoted to general agent of the freight department at Detroit, Mich., a newly created position.

Earl W. Ireland, assistant general passenger agent of the Chicago Great Western at Kansas City, Mo., has been promoted to general passenger agent, with headquarters at Chicago, succeeding **Roy A. Bishop**, who resigned on May 1 to become general traffic manager of the Universal Aviation Corporation at Chicago.

F. E. Pennington, acting division passenger agent of the Missouri Pacific at Memphis, Tenn., has been promoted to general agent of the freight and passenger departments at Washington, D. C., succeeding **J. W. Brennan**, who resigned on May 3 to become central traffic manager of Transcontinental Air Transport, Inc., with headquarters at St. Louis, Mo.

E. B. Hankey, assistant general freight agent of the Pennsylvania, with headquarters at Buffalo, N. Y., has been appointed assistant general freight agent at Pittsburgh, Pa., succeeding **R. H. Miller**, promoted. **W. C. Sommers**, division freight agent at Wheeling, Pa., has been appointed assistant general freight agent at Buffalo, succeeding Mr. Hankey. Mr. Sommers will in turn be succeeded by **Fred Carpi**, chief rate clerk in the general freight offices at Pittsburgh.

Edward A. Niel, freight traffic manager of the Buffalo, Rochester & Pittsburgh, with headquarters at Rochester, N. Y., has been appointed traffic manager, with the same headquarters. The position of freight traffic manager has been abolished. **Harry E. Huntington**, general passenger agent at Rochester, has been appointed assistant traffic manager, with headquarters at the same point. **Jerrold P. DeVaughn** has been appointed general passenger agent, succeeding Mr. Huntington. **Everett D. Davis**, assistant freight traffic manager, with headquarters at Rochester, has resigned to engage in other business and the duties of that office will be assumed by the assistant traffic manager.

Engineering, Maintenance of Way and Signaling

M. C. Cleveland, principal assistant engineer of the Lehigh Valley, with headquarters at New York, has been appointed assistant chief engineer, with the same headquarters.

V. B. Elliott has been appointed construction engineer in charge of the engineering department of the Clinchfield, with headquarters at Erwin, Tenn. **Charles K. Lucas** has been appointed office engineer, with headquarters at Erwin. The position of chief engineer has been abolished.

W. B. McCaleb, engineer of water service of the Pennsylvania, with headquarters at Philadelphia, Pa., has been appointed general superintendent of water service. **J. A. Russell**, engineer of water companies, will succeed Mr. McCaleb as engineer of water service at Philadelphia.

Richard Brooke, who has been appointed engineer maintenance of way of the Chesapeake & Ohio, with headquarters at Richmond, Va., was born at Sutherlin, Va., and was graduated from the Virginia Military Institute in 1908. He entered railway service in April, 1909, as rodman on the Cumberland division of the Baltimore & Ohio, serving in the same capacity successively on the New Castle and Pittsburgh divisions. He was promoted to the position of transitman on the latter division in March, 1911 and in August of the same year he was appointed draftsman. He was appointed assistant division engineer in June, 1912. He served as assistant engineer on the Main Line division from

February, 1916, to January, 1917, when he was transferred to the office of the engineer of maintenance of way. Mr. Brooke served in the United States army from June, 1917, until August, 1919, when he re-entered the service of the Baltimore & Ohio as engineer of the Charleston division. He left the Baltimore and Ohio in April, 1925, to make a study and report on the railway, and port facil-



Richard Brooke

ties of the Anglo-Chilean Nitrate Consolidated Corporation in South America. Upon the completion of this work in December, 1925, he entered the service of the Chesapeake & Ohio as special engineer in the office of the vice-president of operation. He was promoted to the position of assistant engineer maintenance of way in February, 1927, in which capacity he served until his recent appointment as engineer maintenance of way, which became effective April 15.

Mechanical

L. W. Shirley has been appointed master mechanic of the Second division of the Oregon-Washington Railroad & Navigation Company, with headquarters at LaGrande, Ore.

Frank A. Leavitt, master mechanic on the Second division of the Oregon-Washington Railroad & Navigation Company, has been transferred to Spokane, Wash., to succeed **T. H. Yorke**, deceased, and will be succeeded by **L. W. Shirley**, district foreman at Cheyenne, Wyo. **W. J. Kirch**, master mechanic of the Kansas division of the Union Pacific with headquarters at Kansas City, Kan., has been transferred to Salt Lake City, Utah to succeed **Z. A. Burrell**, who has been appointed district foreman at Montpelier, Idaho and will be succeeded by **P. J. Morton**, district foreman of the Union Pacific at Council Bluffs, Ia.

Special

E. A. Weir has been appointed director of radio of the Canadian National, with headquarters at Montreal, Que., succeeding **A. R. McEwan**, deceased.

Obituary

J. E. Nelson, superintendent of the Hornepayne division of the Canadian National at Hornepayne, Ont., died at his home in that city on April 21 at the age of 63 years.

Frank H. Wheeler, New England freight agent of the Delaware & Hudson died on April 29. Mr. Wheeler entered the service of the Delaware & Hudson in 1903 and held the position of New England freight agent from January, 1907, until the time of his death.

John L. Ferguson, who retired in 1926 as assistant to the passenger traffic manager of the Chicago & North Western, with headquarters at Chicago, following seven years as general passenger agent, died at the home of his son at Los Angeles, Cal., on April 30.

William Gibson, formerly general superintendent of transportation of the Baltimore & Ohio, died in Pittsburgh, Pa., on April 10. Mr. Gibson was born in Edinburgh, Scotland, on August 23, 1858. He was educated in the University of Edinburgh, coming to the United States shortly afterwards as a member of a small group selected to operate the Alabama Great Southern. He subsequently became superintendent of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, O. He was later appointed general superintendent of the Baltimore & Ohio at Baltimore, Md., then becoming general superintendent of transportation of the same road. He left railroad work in 1902 to become president of the Pittsburgh Brake Shoe Company and lately had been associated with the American Brake Shoe & Foundry Company.

Atlantic systems of the Southern Pacific. Following E. H. Harriman's co-ordination of the Union Pacific, the Southern Pacific, the Oregon Short Line and the Oregon Railroad and Navigation Company (now the Oregon-Washington Railroad & Navigation Company), into one system in 1904, Mr. Isaacs was appointed consulting engineer, on December 1, 1905, in matters relating to construction and maintenance of bridges and buildings, signaling and preservation of timber, with headquarters at San Francisco. He was a member of the staff of the director of maintenance and operation, Julius Krutschmitt, and his work also included the handling of questions relating to standards and costs of work and his jurisdiction extended over about 11,500 miles of line, what was then the largest mileage directly under one management. His headquarters were removed to Chicago in 1907 and later to New York. On February 1, 1913, upon the dissolution of the merger of the



John D. Isaacs

John D. Isaacs, formerly consulting engineer of the Harriman Lines and more recently consulting engineer of the Southern Pacific, until his retirement from active service in 1923, died at his home in San Francisco, Cal., on April 26, at the age of 80 years. Mr. Isaacs had been in the service of the Southern Pacific for more than 48 years. He was born on October 6, 1848, at Richmond, Va., and graduated from the University of Virginia in 1870 where he took what was known as the "scientific course." His early practical training was as a machinist's apprentice at Baltimore, Md., and Wilmington, Del., after which he entered railway service on March 1, 1875, as a draftsman in the maintenance of way department of the Southern Pacific. Shortly thereafter he was advanced to chief draftsman and in June, 1885, he was promoted to assistant superintendent of bridges and buildings. Five years later Mr. Isaacs was appointed acting superintendent of bridges and buildings and in 1891 he was promoted to second assistant engineer of maintenance of way of the Pacific system of the Southern Pacific, his jurisdiction being extended to cover the lines in Oregon in 1900. At that time he was also appointed engineer of bridges of both the Pacific and the

Southern Pacific and the Union Pacific, he resigned as consulting engineer of the Union Pacific, retaining his position as consulting engineer of the Southern Pacific, with headquarters at New York, until his retirement from active service in June, 1923. Mr. Isaacs was a pioneer in timber preservation, inventing in 1892, with W. G. Curtis, a portable wood preserving plant. As a bridge engineer he was responsible for the construction of a number of outstanding structures, including the Sacramento River bridge of the Southern Pacific and a number of large viaducts on the lines in Washington. He also invented a taper rail which did away with compromise joints, and in conjunction with J. B. Speed, he invented a rifted pipe line. In 1878 he completed a device which contributed to the development of the motion picture industry, a simple electro-magnetic release which made it possible to obtain a series of photographs of a moving object. The device was developed to enable Leland Stanford, then president of the Central Pacific, to settle a friendly dispute with James W. Keene, as to whether a trotting horse at one period of its stride had all four feet off the ground at once.